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FINAL

Confirmation Sampling and Analysis Report for Installation Restoration Program Site ST35 Ordnance Testing Laboratory Oil Leak

Air Force Plant PJKS
Colorado

Prepared For

Air Force Center for Environmental Excellence
Brooks Air Force Base, Texas

and

Headquarters Aeronautical Systems Center
Environmental Management Division (ASC/EMR)
Wright-Patterson AFB, Ohio

February 1998

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FINAL

CONFIRMATION SAMPLING AND ANALYSIS REPORT FOR INSTALLATION RESTORATION PROGRAM SITE ST35 ORDNANCE TESTING LABORATORY OIL LEAK AIR FORCE PLANT PJKS, COLORADO

Prepared for:

Air Force Center for Environmental Excellence
Brooks AFB, Texas

and

Headquarters Aeronautical Systems Center
Environmental Management Division (ASC/EMR)
Wright-Patterson AFB, Ohio

February 1998

Prepared by:

Parsons Engineering Science, Inc.
1700 Broadway, Suite 900
Denver, Colorado 80290

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LIST OF ACRONYMS AND ABBREVIATIONS

AFCEE	Air Force Center for Environmental Excellence
AFP	Air Force Plant
ASC/EMR	Headquarters Aeronautical Systems Center/Environmental Management Division
bgs	Below ground surface
BTEX	Benzene, toluene, ethylbenzene, and xylenes
CDOLE	Colorado Department of Labor and Employment
CDPHE	Colorado Department of Public Health and Environment
DOT	Department of Transportation
ES	Engineering-Science, Inc.
IRP	Installation Restoration Program
mg/kg	Milligrams per kilogram
MP	Monitoring point
NFRAP	No Further Response Action Planned
NPL	National Priorities List
OTL	Ordnance Testing Laboratory
OU	Operable Unit
Parsons ES	Parsons Engineering Science, Inc.
PID	Photoionization detector
PQL	Practical quantitation limit
QA/QC	Quality Assurance/Quality Control
RAC	Remedial Action Category
SAP	Sampling and Analysis Plan
SRI/FS	Supplemental Remedial Investigation/Feasibility Study
TEPH	Total extractable petroleum hydrocarbon
TIC	Tentatively identified compound
TOC	Total organic carbon
TPH	Total petroleum hydrocarbon
TVPH	Total volatile petroleum hydrocarbon
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency

UST	Underground storage tank
VOC	Volatile organic compound
VW	Vent well

SECTION 1

INTRODUCTION

1.1 PURPOSE

This confirmation sampling and analysis report for Air Force Installation Restoration Program (IRP) Site ST35 at Air Force Plant (AFP) PJKS has been prepared by Parsons Engineering Science, Inc. (Parsons ES) as part of the Air Force Center for Environmental Excellence (AFCEE) Extended Bioventing Project. Site ST35 is the former location of a heating oil underground storage tank (UST) and is located at the Ordnance Testing Laboratory (OTL) which is within designated Operable Unit 6 (OU6) of the National Priorities List (NPL) AFP PJKS Site. The purpose of this report is to support a no-further-response-action-planned (NFRAP) status for vadose zone soils contaminated by heating oil in the immediate vicinity of the former UST, pursuant to closure of IRP Site ST35.

1.2 PROJECT BACKGROUND

Since 1992, AFP PJKS has participated in two AFCEE-sponsored bioventing projects; presently, the Extended Bioventing Project; and formerly, the Bioventing Pilot Test Initiative. The Bioventing Pilot Test Initiative included conducting more than 135 *in situ* bioventing pilot tests at 48 Air Force installations nationwide. These tests were designed to collect data on the effectiveness of bioventing for the remediation of soil contaminated with fuel hydrocarbons (e.g., JP-4 jet fuel, diesel fuel, gasoline, or heating oil). As part of this project, a bioventing pilot test was conducted at Site ST35. The bioventing pilot testing effort consisted of installing one bioventing air injection vent well (VW) and five soil gas monitoring points (MPs); performing initial and approximately 6-month and 1-year *in situ* respiration and fuel biodegradation measurements; air permeability testing; and collection of soil and soil gas samples prior to, and after, extended air injection bioventing. The pilot-scale system was operated and monitored for a total of approximately 14 months (from May 1993 to July 1994) at which time final respiration tests were conducted and soil gas samples were collected and analyzed. Soil samples were collected and analyzed approximately 4 months later, in November 1994.

Under the Extended Bioventing Project, Site ST35 was funded for confirmation soil sampling (Option 2) to document the effectiveness of soil remediation at the site and to demonstrate compliance with Colorado Department of Labor and Employment (CDOLE), Oil Inspection Section, UST cleanup requirements for closure of the vadose zone soils. In preparation for the confirmation sampling, a site-specific sampling and

analysis plan (SAP) was prepared by Parsons ES (1996) for AFCEE, the Environmental Management Division at Headquarters Aeronautical Systems Center (ASC/EMR), and AFP PJKS. A copy of the SAP is provided as Appendix A.

Following AFCEE and ASC/EMR approval of the SAP, confirmation soil sampling was conducted at Site ST35 on 3 and 4 December 1996. Confirmation sampling activities consisted of advancing eight boreholes to depths ranging from 20 to 27.5 feet below ground surface (bgs), and analyzing selected soil samples for hydrocarbon constituents to support site closure. A total of 17 soil samples, including one field replicate sample, were submitted for analysis from the eight boreholes.

1.3 REGULATORY FRAMEWORK

Site ST35 is an interim-status site under the IRP. In addition to the confirmation soil sampling discussed in this report, a supplemental remedial investigation/feasibility study (SRI/FS) that considers Site ST35, as well as site groundwater (which is included in OU5 of the NPL site) is ongoing. As a result, site-specific closure requirements for Site ST35 have not been established. The Colorado Department of Public Health and Environment (CDPHE) and the United States Environmental Protection Agency (USEPA) Region VIII are currently negotiating an agreement with the Air Force that will determine how the site will be regulated. Because the interagency agreement among the Air Force, USEPA, and CDPHE has not been finalized, the confirmation soil sampling at Site ST35 represents a voluntary action. As a result, the SAP (Appendix A) to perform confirmation sampling was based upon generally accepted sampling protocols for fuel UST site closure soil sampling (CDOLE, 1995).

Although site-specific soil cleanup standards have not been established for Site ST35 pending negotiation of the interagency agreement, State of Colorado storage tank site cleanup standards are adopted as cleanup goals for fuel-contaminated soils at Site ST35. Storage tank cleanup standards are presented in the Storage Tank Facility Owner/Operator Guidance Document (CDOLE, 1995). Storage tank sites formerly under the jurisdiction of the CDPHE are now under the jurisdiction of the CDOLE, Oil Inspection Section.

State of Colorado cleanup standards are dependent on the beneficial use classification of the aquifer impacted or potentially impacted by soil petroleum hydrocarbon contamination. Based on known site conditions, site soils and the underlying groundwater at the site would likely be classified as Remedial Action Category II (RAC II), an intermediate category based on potential future use of the aquifer as a potable water source.

Assuming a RAC II classification for Site ST35, contaminated soils that have impacted or have the potential to impact RAC II groundwater should be remediated to concentrations less than or equal to 50 milligrams per kilogram (mg/kg) total benzene, toluene, ethylbenzene, and xylenes (BTEX) and 250 mg/kg total petroleum hydrocarbons (TPH) (TPH is a general term used by CDOLE [1995] and consists of three petroleum hydrocarbon ranges which include total volatile petroleum

hydrocarbons [TVPH], total extractable petroleum hydrocarbons [TEPH], and oil and grease. TEPH represents the mid-range [C11-C28] hydrocarbons, the primary petroleum hydrocarbons present in diesel fuel and heating oil). These levels may be determined by the State of Colorado to be more or less stringent based upon the results of a risk assessment and a feasibility study (FS) (CDOLE, 1995).

1.4 SUMMARY OF CONFIRMATION SAMPLING RESULTS

The analytical results for all confirmatory vadose zone soil samples collected during the December 1996 soil sampling event were below the 50 mg/kg cleanup criterion for total BTEX, and the results for 12 of the 17 samples which were analyzed for TEPH were below the generic cleanup criterion of 250 mg/kg for TPH. TEPH concentrations that exceeded the RAC II criterion ranged from 267 mg/kg to 1,020 mg/kg. Based on these results, site remediation activities have successfully reduced BTEX concentrations across the site; however, limited exceedances of the state TPH cleanup level exist within the vadose zone at the site. Although TEPH results exceeded the CDOLE (1995) generic cleanup criterion in five samples, because of the relatively low solubility of the residual heating oil constituents represented by TEPH, these remaining fuel constituents in the vadose zone soils likely pose little risk to human health or the environment. Based on the almost complete destruction of the more mobile BTEX compounds and limited amount of TEPH remaining in site soils, an NFRAP decision is recommended for vadose zone soils at Site ST35.

1.5 REPORT ORGANIZATION

This site confirmation sampling and analysis report consists of five sections, including this introduction, and three appendices. Section 2 includes a brief site description and history. Section 3 is a description of the confirmation soil sampling activities conducted at the site. Section 4 contains a summary of confirmation sampling analytical results and a recommendation for closure of vadose zone soils in the vicinity of the former UST. References used in preparation of this study are provided in Section 5.

Appendix A presents a copy of the confirmation SAP for Site ST35 which includes a detailed summary of previous site investigations. Appendix B provides copies of site borehole logs, and Appendix C presents laboratory analytical data for site environmental and quality assurance/quality control (QA/QC) samples.

SECTION 2

SITE DESCRIPTION AND HISTORY

AFP PJKS is located on 460 acres of land in the foothills of the Colorado Front Range, northwest of the town of Waterton, and 20 miles southwest of the city of Denver. AFP PJKS is surrounded by approximately 4,700 acres of land owned by the Lockheed Martin Astronautics (formerly Martin-Marietta), the plant operator. From 1956 until the present, AFP PJKS activities have consisted primarily of missile and rocket assembly, engine testing, and research and development. In 1989, AFP PJKS was placed on the NPL.

2.1 SITE LOCATION AND HISTORY

The OTL area is located in the southeastern portion of AFP PJKS and has been designated as OU6. Figure 2.1 is a layout of the OTL area. Three potential source areas for contamination within OU6 have been identified and investigated under the Air Force IRP. These sites are Site ST35, the oil leak from the former heating oil UST (the subject of this report); Site OT09, an open detonation/open burning unit; and Site SS52, a process water cavitette and associated piping and leachfield. The former UST that contained number 2 heating fuel was located along the east side of Building T-26 (Figure 2.1). In 1985, a leak was detected in the UST. The volume of the leak was estimated to be between 600 and 1,000 gallons, based on tank inventory measurements (Engineering-Science, Inc. [ES], 1992).

Discovery of the release prompted removal of the tank and investigations of the areal extent of soil and groundwater contamination. The tank, which was buried 3 feet bgs and surrounded by an open-bottomed concrete vault, was removed in November 1985 by Martin Marietta. A rupture in the tank measuring approximately 0.25-inch in diameter was observed at the southern end of the tank bottom during removal (ES, 1992).

2.2 TOPOGRAPHY, HYDROLOGY, GEOLOGY, AND HYDROGEOLOGY

2.2.1 Topography and Surface Hydrology

The topography of AFP PJKS is dominated by a central east/west valley separating linear ridges to the east and rugged irregular mountains to the west. The plant is located west of the Dakota Sandstone hogback, which is a north-northwest/south-

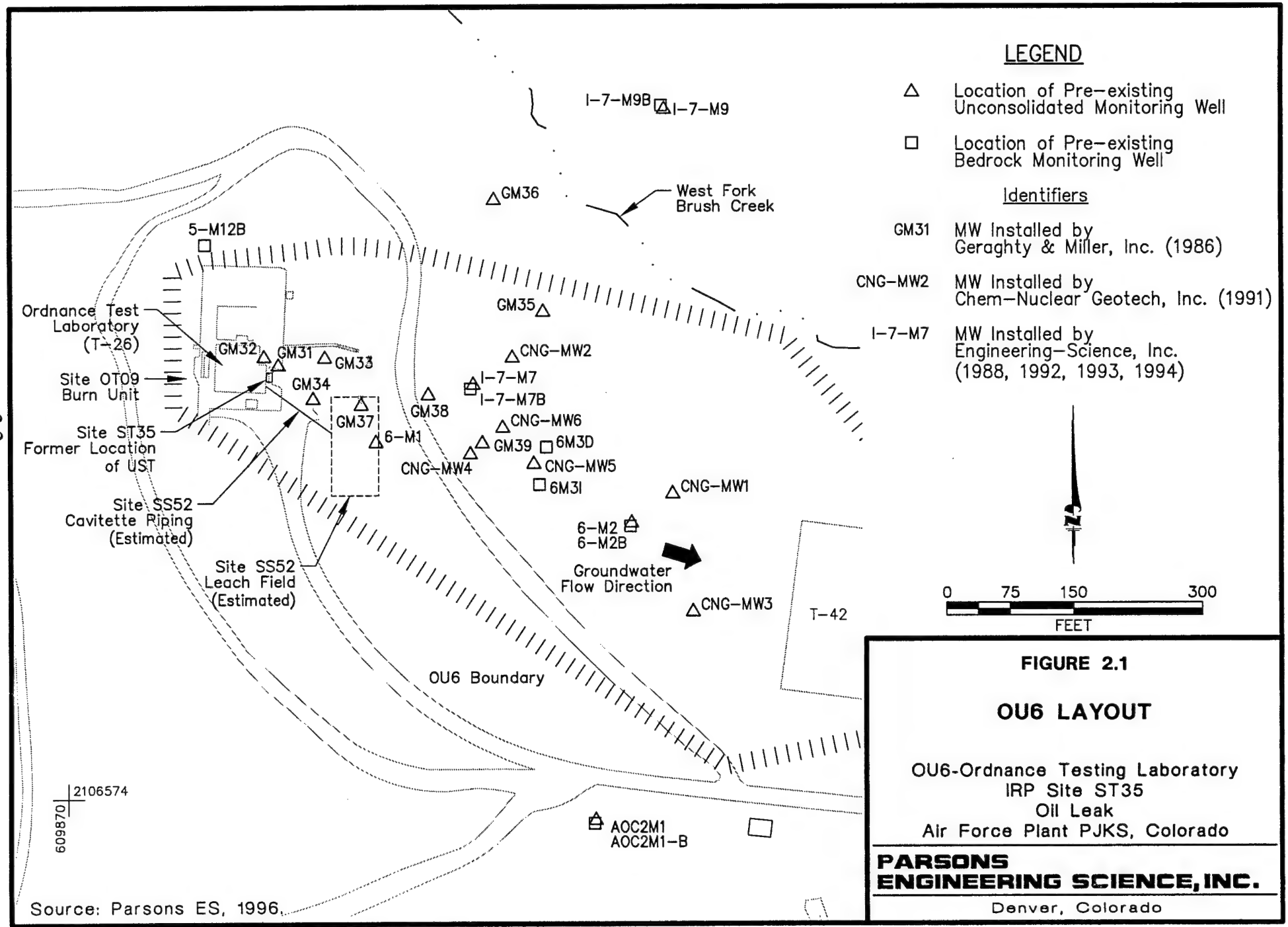

FIGURE 2.1

OU6 LAYOUT

OU6-Ordnance Testing Laboratory
IRP Site ST35
Oil Leak
Air Force Plant PJKS, Colorado

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Denver, Colorado

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southeast trending exposure of uplifted sandstone that separates the foothills topography to the west from the plains to the east. AFP PJKS is dissected by the drainages of the East and West Forks of Brush Creek. The East Fork of Brush Creek contains water year round, and the West Fork of Brush Creek is an intermittent stream.

Site ST35 is situated on a low, level bench approximately 1,200 feet west of the confluence of the West Fork of Brush Creek and the D-1 Tributary. At its closest point, the West Fork of Brush Creek passes to the northwest of the OTL at a distance of more than 400 feet (Figure 2.1). The site elevation is approximately 6,060 feet above mean sea level.

2.2.2 Geology and Hydrogeology

The geology beneath OU6 is characterized by fill material and unconsolidated Quaternary alluvial deposits overlying a zone of thin, weathered, sandstone bedrock of the Fountain Formation. Fill and alluvium thicknesses range from approximately 0 to 39 feet beneath OU6. The alluvium is generally poorly sorted, but the basal section contains locally discontinuous, moderately well-sorted sands. The weathered bedrock is usually less than 10 feet thick, and forms a more permeable veneer overlying well-cemented Fountain Formation sandstones. The water table beneath OU6 is generally coincident with the top of the weathered sandstone Fountain bedrock at a depth of approximately 20 to 25 feet bgs. A detailed description of the OU6 geology and hydrogeology is provided in the SAP (Appendix A).

Subsurface soils encountered during closure sampling at Site ST35 consisted of fill material and alluvial deposits overlying weathered sandstone bedrock. The site was covered with asphalt and concrete pavement. Fill material, consisting of silt and clay with lesser amounts of sand and gravel, extended from the base of the pavement to a depth of approximately 12 feet bgs. Beneath the fill was about 5 to 10 feet of unconsolidated alluvial material overlying the weathered bedrock surface. The upper 4 to 7 feet of alluvial material consisted predominantly of clayey silt, and a 2- to 4-foot thick layer of mixed-grain sand with a trace of gravel was encountered at the base of the alluvium. Soil moisture ranged from dry to moist, and groundwater was not encountered in any confirmation borehole.

2.3 PREVIOUS INVESTIGATIONS

Previous investigations conducted at OU6 and Site ST35 identified BTEX, TPH, and other organic compounds in soils and groundwater. Because BTEX and TPH were the dominant contaminants identified at Site ST35, a bioventing system was installed and operated by Parsons ES at Site ST35 to remediate vadose zone soils. Summaries of these investigations and bioventing remediation activities are included in the SAP (Appendix A).

SECTION 3

SITE CONFIRMATION SAMPLING AND ANALYSIS ACTIVITIES

The purpose of this section is to describe site confirmatory soil sampling activities, including borehole locations and sampling depths, sampling procedures, analytical methods used, and QA/QC procedures followed. These methods/procedures are described in the closure SAP for Site ST35 (see Appendix A). The closure SAP was implemented by qualified Parsons ES scientists and technicians trained in the conduct of soil sampling, records documentation, and chain-of-custody procedures. Environmental sample analyses were provided by Intertek (formerly Inchcape) Testing Services, an AFCEE-approved laboratory.

3.1 SITE CLOSURE BOREHOLE LOCATIONS AND SAMPLING DEPTHS

Confirmatory soil sampling was conducted at the site on 3 and 4 December 1996. Eight boreholes (OTL-1 through OTL-8) were advanced at the site, and soil samples were collected to confirm that hydrocarbon concentrations have been remediated to within acceptable levels. In addition to the seven boreholes proposed in the SAP, one additional borehole (OTL-8) was drilled to confirm that soil contamination does not extend south of the proposed sampling area. Borings OTL-1 through OTL-5 were advanced in the immediate vicinity of the former UST, and the remaining three borings in the area where previous investigations identified TPH soil concentrations exceeding 250 mg/kg. Figure 3.1 shows the locations of the eight confirmatory soil sampling borehole locations and the previously identified estimated area where TPH concentrations exceeded 250 mg/kg. Samples for geologic logging, field photoionization detector (PID) screening for volatile organic compounds (VOCs), and possible chemical analysis were collected at 5-foot intervals from ground surface to the total depth of each boring.

3.2 DRILLING, SAMPLING, AND EQUIPMENT DECONTAMINATION

Boreholes were advanced using a truck-mounted drill rig equipped with 4.25-inch, inside-diameter hollow-stem augers. Prior to drilling, the drill rig and other downhole equipment were decontaminated using a high-pressure, steam/hot water wash followed by a rinse with potable water. Clean cuttings (with background PID screening VOC results) were used to backfill the boreholes from which they were generated. Cuttings and residual soil samples with PID screening results above background VOC levels, and excess clean cuttings generated during sampling activities, were placed in US

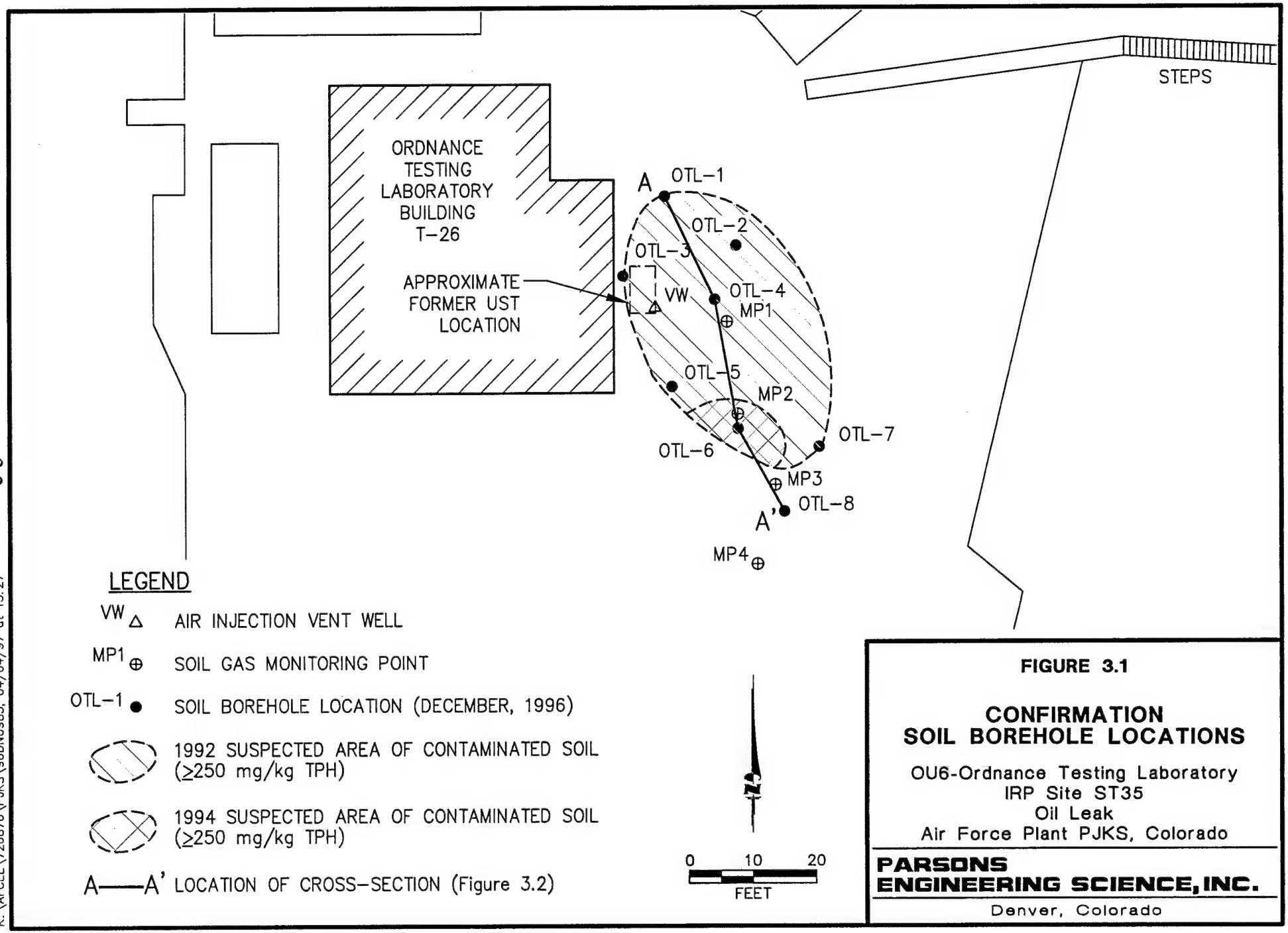

FIGURE 3.1

CONFIRMATION SOIL BOREHOLE LOCATIONS

OU6-Ordnance Testing Laboratory
IRP Site ST35
Oil Leak
Air Force Plant PJKS, Colorado

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Denver, Colorado

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Department of Transportation (DOT)-approved 55-gallon drums. Drummed soil was transported to and is temporarily being stored in warehouse facility T1A. Upon the next Parsons ES visit to AFP PJKS, the eight drums (one for each borehole) of soil cuttings generated during drilling and sampling will be transported to the D-1 Landfill at AFP PJKS and placed in the soil stockpile.

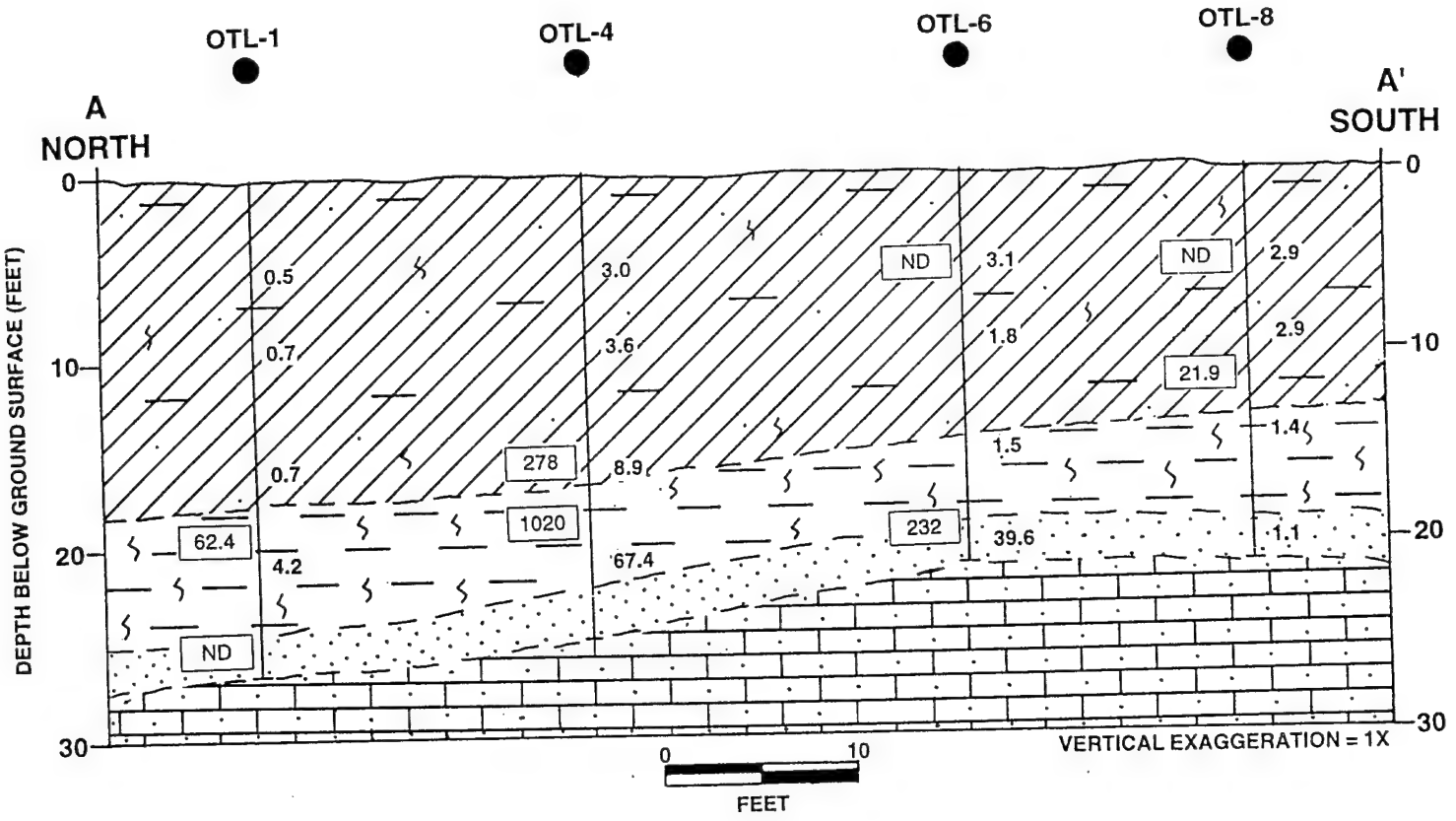
Rinseate water generated at the drill site during decontamination of the sampling spoons and brass sleeves was collected and transported to a centralized decontamination facility approximately 1,500 feet east of the site. Augers used during drilling were decontaminated at this same facility. At this facility, the decontamination/equipment rinseate water was accidentally released to the ground surface after the earthen berm surrounding the decontamination pad failed. Based on the non-detect and near non-detect soil results presented in Section 4, the released water was very likely to be "clean" and poses no threat to human health or the environment.

Relatively undisturbed soil samples, suitable for chemical analysis, were collected at 5-foot intervals from ground surface to the total depth of the boring. Soil samples were collected using a standard split-barrel sampler lowered through the hollow stem of the augers and driven approximately 1.5 feet (or to refusal, if shallower) into undisturbed soil, ahead of the augers. Between sampling events, the split-barrel sampler was cleaned with Alconox® detergent, followed by successive potable and distilled water rinses.

The split-barrel sampler was fitted with three precleaned, 6-inch-long, thin-walled, brass sleeves. Before samples were collected, sample sleeves were cleaned using the same procedure as that described for the sampler. After collection of a sample, the sampler was retrieved and split apart, and the sleeves were removed. In preparation for laboratory submittal, the ends of the lowest (i.e., deepest) brass sleeve were covered with Teflon® sheets and plastic end caps.

The upper (i.e., shallower) sample sleeves were used for geologic logging and soil headspace screening. Soil headspace samples were screened in the field for organic vapors using a PID. The headspace analysis portion of the sample was placed in a clean 8-ounce jar, sealed with aluminum foil, and allowed to equilibrate for approximately 10 minutes. The foil top was then pierced with the detector probe of the PID, and a VOC headspace reading was measured. Headspace samples were used to evaluate the relative concentrations of hydrocarbons in the soil samples and aid in laboratory sample selection. A summary of the soil headspace screening results is presented on the individual boring logs presented in Appendix B. Lithologic descriptions of the soil samples were performed in the field by a Parsons ES geologist. Soil types were classified according to the Unified Soil Classification System (USCS) and described in accordance with the standard Parsons ES soil description format. These geologic borehole logs are presented in Appendix B. A cross-section of site soils is presented on Figure 3.2.

Soil samples in the brass sleeves selected for laboratory analysis were labeled with the site name and borehole number, sample depth, date of collection, and other



LITHOLOGIC DESCRIPTION

FILL SILT CLAY AND SAND

SILT AND CLAY

SAND

SANDSTONE BEDROCK

LEGEND

BOREHOLE

67.4 FIELD SCREENING RESULTS FOR VOLATILE ORGANIC COMPOUNDS (ppmv)

278 LABORATORY RESULTS FOR TOTAL EXTRACTABLE HYDROCARBONS (mg/kg)
ND = NOT DETECTED

FIGURE 3.2

HYDROGEOLOGIC CROSS-SECTION A-A'

OU6 - Ordnance Testing Laboratory
IRP Site ST35 Oil Leak
Air Force Plant PJKS, Colorado

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pertinent data. Vinyl plastic end caps were securely fastened to the brass sleeves with tape, and the brass sleeves were placed in an insulated shipping container packed with ice. Samples for laboratory analysis were shipped under standard chain-of-custody procedures to Intertek Testing Services located in Richardson, Texas.

At the completion of each borehole, clean soil cuttings were used to backfill the borehole to a depth of approximately 1 foot below the pavement surface. The remainder of each borehole was filled with cement/bentonite grout to the pavement surface to prevent the creation or enhancement of contaminant migration pathways to groundwater.

3.3 FIELD AND LABORATORY DATA QUALITY ASSURANCE/QUALITY CONTROL

Four QA/QC samples were collected during field activities. The samples included one equipment rinseate blank, one field replicate, one trip blank, and one sample for laboratory matrix spike/matrix spike duplicate analysis.

3.4 SOIL ANALYSIS

All samples were analyzed by Intertek Testing Services, an AFCEE-approved laboratory. The sample analytical methods and practical quantitation limits (PQLs) used during this effort are presented in Table 3.1. All soil samples were analyzed by USEPA Method SW8240 for BTEX and chlorinated VOCs, and by USEPA Method SW8015 modified for diesel-range TEPH. Two soil samples also were analyzed for total organic carbon (TOC) by USEPA Method SW9060.

TABLE 3.1
SOIL SAMPLE ANALYTICAL METHODS, PRACTICAL QUANTITATION LIMITS, AND NUMBER OF CONFIRMATORY SAMPLES
OU6 - ORDNANCE TESTING LABORATORY
IRP SITE ST35, OIL LEAK
AIR FORCE PLANT PJKS, COLORADO

Analyte	Number of Samples [a]	PQL (mg/kg) [b]
USEPA Method SW8015		
Modified for Diesel-Range Organics	17	10.0
USEPA Method SW8240B		
Acetone	17	0.1
Benzene	17	0.005
Bromodichloromethane	17	0.005
Bromoform	17	0.005
Bromomethane	17	0.01
2-Butanone	17	0.05
Carbon disulfide	17	0.005
Carbon tetrachloride	17	0.005
Chlorobenzene	17	0.005
Chlorodibromomethane	17	0.005
Chloroethane	17	0.01
2-Chloroethyl vinyl ether	17	0.01
Chloroform	17	0.005
Chloromethane	17	0.01
1,1-Dichloroethane	17	0.005
1,2-Dichloroethane	17	0.005
1,1-Dichloroethene	17	0.005
cis-1,2-Dichloroethene	17	0.005
trans-1,2-Dichloroethene	17	0.005
1,2-Dichloropropane	17	0.005
cis-1,3-Dichloropropene	17	0.005
trans-1,3-Dichloropropene	17	0.005
Ethylbenzene	17	0.005
2-Hexanone	17	0.05
Methylene chloride	17	0.005
4-methyl-2-Pentanone	17	0.05
Styrene	17	0.005
1,1,2,2,-Tetrachloroethane	17	0.005
Tetrachlorethene	17	0.005
Toluene	17	0.005
1,1,1-Trichloroethane	17	0.005
1,1,2-Trichloroethane	17	0.005
Trichloroethene	17	0.005
Vinyl acetate	17	0.05
Vinyl chloride	17	0.002
m,p-Xylene	17	0.005
o-Xylene	17	0.005
USEPA Method SW9060		
Total Organic Carbon	2	NA [c]

[a] Excludes QC samples.

[b] PQL = Intertek (fomerly Inchcape) Testing Services Laboratory, Richardson, Texas, practical quantitation limit; mg/kg = milligrams per kilogram.

[c] NA = Not available.

SECTION 4

RESULTS, CONCLUSIONS, AND RECOMMENDATIONS

This section summarizes the analytical results from the confirmatory soil sampling conducted at Site ST35. Based on earlier site investigations and bioventing pilot testing, and on the results of the closure sample analyses, conclusions regarding remediation of fuel contaminants in vadose zone soils are summarized, and recommendations for the site are presented.

4.1 LABORATORY RESULTS

Complete soil analytical results from Intertek Testing Services are presented in Appendix C, and these results summarized in Tables 4.1 and 4.2. A total of 17 confirmatory soil samples, including one field replicate, were collected at Site ST35 and submitted for laboratory analysis of BTEX, chlorinated VOCs, and TEPH. Two soil samples from each borehole with the highest field PID screening results were submitted for laboratory analyses. One replicate sample (designated OTL-18) was collected from the 10-11.5-foot depth interval of boring OTL-8. Total BTEX ranged from 0.007 mg/kg in sample OTL-2, collected from a depth of 25 to 26.5 feet bgs, to 0.024 mg/kg in sample OTL-5, collected at a depth of 20 to 21.5 feet bgs. Total BTEX results were below the CDOLE (1995) cleanup criterion of 50 mg/kg for a RAC II site classification for all soil samples. Toluene and ethylbenzene were the only VOCs detected above the respective PQLs in the 17 samples submitted for analysis. Acetone was detected in 7 samples at estimated concentrations below the reporting limit of 0.10 mg/kg. No chlorinated VOCs were detected above the PQLs listed in Table 3.1.

TEPH was detected above the PQL in 9 of the 17 samples submitted for analysis. Five of these detections exceeded the state RAC II cleanup criterion of 250 mg/kg. Total TEPH ranged from 15.5 mg/kg in sample OTL-8, collected from a depth of 10 to 11.5 feet bgs, to 1,020 mg/kg in samples OTL-3, collected at a depth of 15 to 16.5 feet bgs, and OTL-4, from a depth of 20 to 21.5 feet bgs. All TEPH concentrations greater than 250 mg/kg were detected in samples collected from depths of 15 feet bgs or greater.

Table 4.2 is a summary of the tentatively identified compounds (TICs) detected in the samples. Because the laboratory equipment was not calibrated for these compounds, the presumptive evidence of TICs is based on a mass spectral library

TABLE 4.1
CONFIRMATORY SOIL SAMPLE ANALYTICAL RESULTS
OU6-ORDANCE TESTING LABORATORY
IRP SITE ST35, OIL LEAK
AIR FORCE PLANT PJKS, COLORADO

Sample ID	Sample Depth (feet)	Date Sampled	Volatile Organic Compounds SW8240					TEPH[a] SW8015-M	TOC[b] SW9060
			Benzene (mg/kg)[c]	Toluene (mg/kg)	Ethyl-benzene (mg/kg)	Xylenes (mg/kg)	Acetone (mg/kg)	(mg/kg)	(mg/kg)
OTL-1	20 - 21.5	12/3/96	0.006 U[d]	**0.009**[e]	0.006 U	0.006 U	0.119 U	**62.4**	NA[f]
OTL-1	25 - 26.5	12/3/96	0.005 U	**0.008**	0.005 U	0.005 U	0.106 U	10.6 U	213 U
OTL-2	10 - 11.5	12/3/96	0.006 U	**0.012**	0.006 U	0.006 U	0.072 J[g]	11.6 U	NA
OTL-2	25 - 26.5	12/3/96	0.006 U	**0.007**	0.006 U	0.006 U	0.026 J	12.0 U	NA
OTL-3	15 - 16.5	12/3/96	0.006 U	**0.015**	0.006 U	0.006 U	0.025 J	**1020.0**[h]	NA
OTL-3	20 - 21.5	12/3/96	0.005 U	0.005 U	**0.007**	0.003 J	0.105 U	**468.0**	NA
OTL-4	15 - 16.5	12/3/96	0.006 U	**0.016**	0.006 U	0.006 U	0.116 U	**278.0**	NA
OTL-4	20 - 21.5	12/3/96	0.006 U	**0.014**	0.006 U	0.006 U	0.114 U	**1020.0**	NA
OTL-5	15 - 16.5	12/4/96	0.006 U	0.006 U	0.006 U	0.006 U	0.116 U	11.6 U	NA
OTL-5	20 - 21.5	12/4/96	0.005 U	**0.009**	**0.015**	0.009 J	0.106 U	**267.0**	NA
OTL-6	5 - 6.5	12/4/96	0.006 U	0.006 U	0.006 U	0.006 U	0.117 U	11.7 U	NA
OTL-6	20 - 21.5	12/4/96	0.005 U	**0.010**	0.005 U	0.005 U	0.100 U	**232.0**	NA
OTL-7	10 - 11.5	12/3/96	0.006 U	0.006 U	0.006 U	0.006 U	0.089 J	11.9 U	NA
OTL-7	20 - 21.5	12/3/96	0.005 U	0.005 U	0.005 U	0.005 U	0.105 U	10.5 U	306
OTL-8	5 - 6.5	12/4/96	0.006 U	**0.012**	0.006 U	0.006 U	0.116 U	11.6 U	NA
OTL-8	10 - 11.5	12/4/96	0.005 U	**0.018**	0.005 U	0.005 U	0.071 J	**15.5**	NA
OTL-18[i]	10 - 11.5	12/4/96	0.006 U	**0.014**	0.006 U	0.006 U	0.091 J	**21.9**	NA

[a] TEH = Total extractable petroleum hydrocarbons, diesel range.

[b] TOC = Total organic carbon.

[c] mg/kg = Milligrams per kilogram.

[d] U - Indicates compound was analyzed for but not detected. Sample quantitation limit shown.

[e] Bold - analyte detected at a concentration above the reporting limit.

[f] NA = Not analyzed.

[g] J - Indicates an estimated value. The compound was detected but was below the reporting limit.

[h] Box - concentration exceeds the assumed applicable cleanup standard of 250 mg/kg TEH for RAC II soils (CDOLE, 1995).

[i] Field replicate of preceding sample (OTL-8).

TABLE 4.2
CONFIRMATORY SOIL SAMPLE ANALYTICAL RESULTS
TENTATIVELY IDENTIFIED COMPOUNDS
OU6-ORDANCE TESTING LABORATORY
IRP SITE ST35, OIL LEAK
AIR FORCE PLANT PJKS, COLORADO

Sample Location	OTL-1	OTL-1	OTL-2	OTL-2	OTL-3	OTL-3
Depth Sampled (feet)	20 - 21.5	25 - 26.5	10 - 11.5	25 - 26.5	15 - 16.5	20 - 21.5
Date Sampled	12/3/96	12/3/96	12/3/96	12/3/96	12/3/96	12/3/96
Volatile Organics[a] SW8240 (mg/kg)[b]						
Heptane, 2-methyl -	—[c]	—	—	0.052 N	—	—
Ethyl acetate	—	—	—	—	—	—
3-Heptane, 2-methyl-, (E) -	—	0.031 N[d]	—	—	—	—
Cyclohexane, 1,2-dimethyl -, trans -	—	—	—	0.058 N	—	—
Cyclohexane, 1,1,3-trimethyl -	—	—	—	0.288 N	—	—
Cyclohexane, 1,2,4-trimethyl -	—	—	—	—	—	—
2-Hexene, 2,3-dimethyl -	—	—	—	—	—	—
Heptane, 2-methyl -	—	—	—	—	—	—
Heptane, 2,3-dimethyl -	—	—	—	0.030 N	—	—
Octane, 4-methyl -	—	0.024 N	—	0.144 N	—	—
Octane, 3-methyl -	—	0.016 N	—	0.082 N	—	—
Cyclohexane, 1,2,3-trimethyl -, (1.	—	—	—	—	—	0.061 N
Cyclohexane, 1,4-dimethyl -, trans -	—	—	—	0.252 N	—	—
Nonane	—	0.066 N	—	—	—	—
1-Ethyl-3-methylcyclohexane (c,t)	—	0.016 N	—	0.156 N	—	—
Cyclohexane, 1,3-dimethyl-, tran -	—	—	—	—	—	—
Nonane, 3-methyl -	—	—	—	0.106 N	—	—
Octane, 2,6-dimethyl -	—	0.022 N	—	—	—	—
Cyclohexane, methyl -	—	—	—	0.216 N	—	0.025 N
Cyclopentane, (2-methylpropyl) -	—	0.041 N	—	—	—	—
trans-1,3-Diethylcyclopentane	—	—	—	0.228 N	—	—
1-Hexacosanol	—	0.117 N	—	—	—	—
Naphthalene, 1-methyl -	—	—	—	—	—	—
Unknown alcohol	—	—	—	—	—	—
Nonane, 2,6-dimethyl -	—	0.051 N	—	—	—	—
Decane, 4-methyl -	—	—	—	0.120 N	—	—
Benzene, 1,2,3-trimethyl -	—	—	—	—	—	—
17-Pentatriacontene	—	—	—	0.064 N	—	—
Benzene, (1-methylpropyl) -	—	—	—	—	—	—
Benzene, 1,2-diethyl -	—	—	—	—	—	—
6-Octenal, 3,7-dimethyl-, (R) -	—	—	—	—	—	0.074 N
7-Octenal, 3,7-dimethyl --	—	—	—	—	—	—
Naphthalene, decahydro -, trans -	—	—	—	0.156 N	—	—
Undecane	—	0.223 N	—	—	—	—
Benzene, 2-ethyl-1,4-dimethyl -	—	—	—	0.114 N	—	—
1-Eicosanol	—	—	—	—	—	—
Benzene, 1-methyl-4-(1-methylethyl	—	—	—	—	—	—
2-Hexyl-1-decanol	—	—	—	—	—	—
1-Tetracosanol	—	0.033 N	—	—	—	—
Benzene, (2-methyl-1-propenyl) -	—	—	—	—	—	—
Dodecane	—	0.106 N	—	—	—	—
Benzene, 1-ethyl-2,4-dimethyl -	—	—	—	—	—	—
Undecane, 2,6-dimethyl -	—	—	—	—	—	—
Octane	—	—	—	—	—	—

TABLE 4.2 (Continued)
CONFIRMATORY SOIL SAMPLE ANALYTICAL RESULTS
TENTATIVELY IDENTIFIED COMPOUNDS
OU6-ORDANCE TESTING LABORATORY
IRP SITE ST35, OIL LEAK
AIR FORCE PLANT PJKS, COLORADO

Sample location	OTL-4	OTL-4	OTL-5	OTL-5	OTL-6	OTL-6
Depth sampled (feet)	15 - 16.5	20 - 21.5	15 - 16.5	20 - 21.5	5 - 6.5	20 - 21.5
Date sampled	12/3/96	12/3/96	12/4/96	12/4/96	12/4/96	12/4/96
Volatile Organics[a/] SW8240 (mg/kg)[b/]						
Heptane, 2-methyl -	—	—	—	—	—	—
Ethyl acetate	—	—	—	—	—	—
3-Heptane, 2-methyl-, (E) -	—	—	—	—	—	—
Cyclohexane, 1,2-dimethyl -, trans -	—	—	—	—	—	—
Cyclohexane, 1,1,3-trimethyl -	—	—	—	—	—	—
Cyclohexane, 1,2,4-trimethyl -	—	—	—	—	—	0.026 N
2-Hexene, 2,3-dimethyl -	—	—	—	0.100 N	—	—
Heptane, 2-methyl -	—	—	—	0.030 N	—	—
Heptane, 2,3-dimethyl -	—	—	—	—	—	—
Octane, 4-methyl -	—	—	—	0.086 N	—	0.040 N
Octane, 3-methyl -	—	0.026 N	—	0.042 N	—	0.014 N
Cyclohexane, 1,2,3-trimethyl -, (1.	—	—	—	—	—	—
Cyclohexane, 1,4-dimethyl -, trans -	—	—	—	—	—	—
Nonane	—	—	—	—	—	—
1-Ethyl-3-methylcyclohexane (c,t)	—	—	—	0.075 N	—	0.058 N
Cyclohexane, 1,3-dimethyl-, tran -	—	—	—	—	—	0.086 N
Nonane, 3-methyl -	—	—	—	—	—	—
Octane, 2,6-dimethyl -	—	0.053 N	—	0.048 N	—	0.057 N
Cyclohexane, methyl -	—	—	—	0.038 N	—	—
Cyclopentane, (2-methylpropyl) -	—	—	—	—	—	—
trans-1,3-Diethylcyclopentane	—	—	—	—	—	—
1-Hexacosanol	—	—	—	—	—	—
Naphthalene, 1-methyl -	—	—	—	—	—	—
Unknown alcohol	—	—	0.162 N	—	—	—
Nonane, 2,6-dimethyl -	—	—	—	—	—	—
Decane, 4-methyl -	—	0.285 N	—	—	—	0.076 N
Benzene, 1,2,3-trimethyl -	—	—	—	0.061 N	—	—
17-Pentatriacontene	—	—	—	—	—	—
Benzene, (1-methylpropyl) -	—	—	—	0.022 N	—	—
Benzene, 1,2-diethyl -	—	—	—	0.060 N	—	—
6-Octenal, 3,7-dimethyl-, (R) -	—	—	—	—	—	—
7-Octenal, 3,7-dimethyl –	—	0.092 N	—	—	—	—
Naphthalene, decahydro -, trans -	—	—	—	—	—	0.085 N
Undecane	—	—	—	—	—	—
Benzene, 2-ethyl-1,4-dimethyl -	—	—	—	—	—	—
1-Eicosanol	—	—	—	—	—	0.057 N
Benzene, 1-methyl-4-(1-methylethyl	—	—	—	0.050 N	—	—
2-Hexyl-1-decanol	—	0.194 N	—	—	—	—
1-Tetracosanol	—	—	—	—	—	—
Benzene, (2-methyl-1-propenyl) -	—	—	—	0.025 N	—	—
Dodecane	—	—	—	—	—	—
Benzene, 1-ethyl-2,4-dimethyl -	—	—	—	0.021 N	—	—
Undecane, 2,6-dimethyl -	—	0.365 N	—	—	—	—
Octane	—	—	—	0.070 N	—	—

TABLE 4.2 (Continued)
CONFIRMATORY SOIL SAMPLE ANALYTICAL RESULTS
TENTATIVELY IDENTIFIED COMPOUNDS
OU6-ORDANCE TESTING LABORATORY
IRP SITE ST35, OIL LEAK
AIR FORCE PLANT PJKS, COLORADO

Sample location	OTL-7	OTL-7	OTL-8	OTL-8	OTL-18
Depth sampled (feet)	10 - 11.5	20 - 21.5	5 - 6.5	10 - 11.5	10 - 11.5
Date sampled	12/3/96	12/3/96	12/4/96	12/4/96	12/4/96
Volatile Organics[a/] SW8240 (mg/kg)[b/]					
Heptane, 2-methyl -	---	---	---	---	---
Ethyl acetate	---	0.012 N	---	---	---
3-Heptane, 2-methyl-, (E) -	---	---	---	---	---
Cyclohexane, 1,2-dimethyl -, trans -	---	---	---	---	---
Cyclohexane, 1,1,3-trimethyl -	---	---	---	---	---
Cyclohexane, 1,2,4-trimethyl -	---	---	---	---	---
2-Hexene, 2,3-dimethyl -	---	---	---	---	---
Heptane, 2-methyl -	---	---	---	---	---
Heptane, 2,3-dimethyl -	---	---	---	---	---
Octane, 4-methyl -	---	---	---	---	---
Octane, 3-methyl -	---	---	---	---	---
Cyclohexane, 1,2,3-trimethyl -, (1.	---	---	---	---	---
Cyclohexane, 1,4-dimethyl -, trans -	---	---	---	---	---
Nonane	---	---	---	---	---
1-Ethyl-3-methylcyclohexane (c,t)	---	---	---	---	---
Cyclohexane, 1,3-dimethyl-, tran -	---	---	---	---	---
Nonane, 3-methyl -	---	---	---	---	---
Octane, 2,6-dimethyl -	---	---	---	---	---
Cyclohexane, methyl -	---	---	---	---	---
Cyclopentane, (2-methylpropyl) -	---	---	---	---	---
trans-1,3-Diethylcyclopentane	---	---	---	---	---
1-Hexacosanol	---	---	---	---	---
Naphthalene, 1-methyl -	---	---	---	---	0.008 N
Unknown alcohol	---	---	---	---	---
Nonane, 2,6-dimethyl -	---	---	---	---	---
Decane, 4-methyl -	---	---	---	---	---
Benzene, 1,2,3-trimethyl -	---	---	---	---	---
17-Pentatriacontene	---	---	---	---	---
Benzene, (1-methylpropyl) -	---	---	---	---	---
Benzene, 1,2-diethyl -	---	---	---	---	---
6-Octenal, 3,7-dimethyl-, (R) -	---	---	---	---	---
7-Octenal, 3,7-dimethyl --	---	---	---	---	---
Naphthalene, decahydro -, trans -	---	---	---	---	---
Undecane	---	---	---	---	---
Benzene, 2-ethyl-1,4-dimethyl -	---	---	---	---	---
1-Eicosanol	---	---	---	---	---
Benzene, 1-methyl-4-(1-methylethyl	---	---	---	---	---
2-Hexyl-1-decanol	---	---	---	---	---
1-Tetracosanol	---	---	---	---	---
Benzene, (2-methyl-1-propenyl) -	---	---	---	---	---
Dodecane	---	---	---	---	---
Benzene, 1-ethyl-2,4-dimethyl -	---	---	---	---	---
Undecane, 2,6-dimethyl -	---	---	---	---	---
Octane	---	---	---	---	---

[a/] Volatile organic compounds listed by retention times.

[b/] mg/kg = Milligrams per kilogram.

[c/] --- Indicates that compound was not detected at a concentration greater than 0.012 mg/kg.

[d/] N - Indicates presumptive evidence of a compound.

search. A total of 43 TICs were detected in the 17 samples. The highest TIC concentration detected in the samples was 0.365 mg/kg for 2,6-dimethyl-undecane, which was collected from borehole OTL-4 at a depth of 20 to 21.5 feet bgs.

4.2 CONCLUSIONS

Because site-specific soil cleanup standards have not been established for Site ST35 pending negotiation of an agreement between CDPHE, USEPA, and the Air Force, State of Colorado storage tank cleanup criteria for a RAC II classification have been adopted as cleanup goals for fuel-contaminated soils at Site ST35. Assuming a RAC II classification for OU6, contaminated soils that have impacted or have the potential to impact RAC II groundwater should be remediated to concentrations of less than or equal to 50 mg/kg total BTEX and 250 mg/kg TPH. These levels may be determined by the State of Colorado to be more or less stringent based upon results of a risk assessment and FS (CDOLE, 1995).

All total BTEX results were below the RAC II cleanup criterion of 50 mg/kg. Although TEPH results exceeded the RAC II cleanup criterion of 250 mg/kg in five soil samples, all of these five samples were collected from depths below exposure intervals for human or ecological receptors (i.e., ≥15 feet bgs). Therefore, there is no likelihood of direct exposure of receptors to soils contaminated with residual fuels at levels above the RAC II TPH criterion. Because the solubility of the remaining TEPH constituents is most likely to be low and because TEPH constituents are generally strongly sorbed to soil (i.e., not mobile in the vadose zone), the potential for significant leaching of TEPH to RAC II groundwater is also considered low. The existence of asphalt and/or concrete pavement at the site further reduces the potential for leaching of soil contaminants to groundwater. Based on this evidence, TEPH is considered unlikely to pose an unacceptable risk to human health or the environment at OU6.

Because total BTEX has been reduced to concentrations equal to or below 0.024 mg/kg, and because the remaining TEPH pose relatively little risk to human health and the environment, these results indicate that site vadose zone soils have been remediated to acceptable risk levels for the target compounds during the period of operation of the bioventing system.

4.3 RECOMMENDATIONS

Confirmatory soil sampling results presented in Section 4.1 are intended to support an Air Force NFRAP decision for vadose zone soils contaminated by heating oil in the immediate vicinity of the former UST, pursuant to closure of IRP Site ST35 and OU6. Based on the site closure soil sample analytical results summarized in Table 4.1, site closure with no further remedial action at the Site ST35 portion of OU6 is recommended. This site meets the RAC II cleanup criterion for total BTEX, and TEPH remaining in the vadose-zone soils poses relatively little risk to human health and the environment. Once closure of Site ST35 has been approved by CDPHE and USEPA Region VIII, it is recommended that the bioventing system be dismantled and removed from the site, and that the VW and MPs be properly abandoned in accordance

with the well procedures outlined in the State of Colorado Water Well Construction Rules 2 CCR 402-2 (State of Colorado, 1995).

SECTION 5

REFERENCES

Engineering-Science, Inc. 1992. *Draft Final Installation Restoration Program Interim Measures Investigation/Feasibility Study Work Plan for Operable Units 1, 4, and 6, Air Force Plant PJKS, Colorado.* Prepared for Aeronautical Systems Division and Air Force Center for Environmental Excellence. Denver, Colorado. June.

Colorado Department of Labor and Employment. 1995. *Storage Tank Facility Owner/Operator Guidance Documents for Initial Site Characterization, Second-Level Site Assessment, Use of State Cleanup Guidelines, and Management of Contaminated Materials.* Oil Inspection Section. Denver Colorado. July.

Parsons Engineering Science, Inc. (Parsons ES). 1996. *Confirmation Sampling and Analysis Plan for Installation Restoration Program Site ST35 - Ordnance Testing Laboratory Oil Leak, Air Force Plant PJKS.* Denver, Colorado. September.

State of Colorado. 1995. Office of the State Engineer, State Board of Examiners of Water Well Construction And Pump Installation Contractors Water Well Construction Rules (2 CCR 402-2). Denver, Colorado. April.

APPENDIX A
CONFIRMATION SAMPLING AND ANALYSIS PLAN

FINAL

Confirmation Sampling and Analysis Plan for Installation Restoration Program Site ST35 Ordnance Testing Laboratory Oil Leak

Air Force Plant PJKS
Colorado

Prepared For

Air Force Center for Environmental Excellence
Brooks Air Force Base

and

Headquarters Aeronautical Systems Center
Environmental Management Division (ASC/EMR)
Wright-Patterson AFB, Ohio

September 1996

PARSONS
ENGINEERING SCIENCE, INC.

1700 Broadway, Suite 900 • Denver, Colorado 80290

FINAL

CONFIRMATION SAMPLING AND ANALYSIS PLAN FOR INSTALLATION RESTORATION PROGRAM SITE ST35 ORDNANCE TESTING LABORATORY OIL LEAK AIR FORCE PLANT PJKS, COLORADO

Prepared for:

Air Force Center for Environmental Excellence
Brooks AFB, Texas
and

Headquarters Aeronautical Systems Center
Environmental Management Division (ASC/EMR)
Wright-Patterson AFB, Ohio

September 1996

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1700 Broadway, Suite 900

Denver, Colorado 80290

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SECTION 1

INTRODUCTION

This confirmation soil sampling and analysis plan (SAP) has been prepared by Parsons Engineering Science, Inc. (Parsons ES), formerly Engineering-Science, Inc. (ES), for submittal to the US Air Force Center for Environmental Excellence (AFCEE), Brooks Air Force Base (AFB), Texas, and Headquarters Aeronautical Systems Center, Environmental Management Division (ASC/EMR), Wright-Patterson AFB, Ohio. The SAP is intended to guide soil sampling at Installation Restoration Program (IRP) Site ST35 at Air Force Plant (AFP) PJKS, Colorado. Site ST35 is the location of a release of heating oil from a former underground storage tank (UST).

In 1992, Site ST35 was selected as a pilot test site for the AFCEE-sponsored Bioventing Pilot Test Initiative Project. The Bioventing Initiative is an ongoing project involving more than 100 *in situ* bioventing pilot tests at 46 Air Force installations nationwide. These tests were designed to collect data on the effectiveness of bioventing for the remediation of vadose zone soils contaminated with fuel hydrocarbons (e.g., JP-4 jet fuel, diesel fuel, gasoline, and heating oil).

The 1-year bioventing pilot test, completed in 1994, was performed at IRP Site ST35, located at the Ordnance Testing Laboratory (OTL), designated Operable Unit 6 (OU6) of the National Priorities List (NPL) AFP PJKS site. Site ST35 is the former location of a heating oil UST. The purpose of the pilot test was to evaluate the effectiveness of bioventing in remediating unsaturated soils contaminated with petroleum hydrocarbons thought to have resulted from heating oil released from the former UST. The UST was removed in November 1985 (Engineering-Science, Inc. (ES), 1992). Based on the results of the extended bioventing test, *in situ* bioventing appears to have reduced petroleum hydrocarbon contamination in site soils sufficiently to meet Colorado Department of Labor and Employment (CDOLE), Oil Inspection Section requirements for closure of the OTL UST site. This SAP presents a plan for confirmation soil sampling to document the effectiveness of remediation of hydrocarbon contaminated soils at the OTL UST site.

This SAP consists of ten sections, including this introduction. Section 2 includes site description, history, and summaries of previous investigations and remediation activities. Section 3 summarizes site closure requirements. A detailed SAP is presented in Section 4. Analytical results will be presented in a confirmation soil sampling report as described in Section 5. Section 6 is a waste management plan for investigation-derived waste generated during drilling and sampling activities. Section 7 lists AFP PJKS support requirements and Section 8 gives the proposed project

schedule. Points of contact are provided in Section 9 and the references cited are provided in Section 10.

The objective of the confirmatory soil sampling is to support an Air Force no-further-response-action-planned (NFRAP) recommendation for the soils contaminated by heating oil in the immediate vicinity of the former UST, pursuant to closure of IRP Site ST35. The proposed closure sampling described in Section 4 is specific to the medium (vadose zone soils) targeted by the bioventing system in the vicinity of the former UST. The confirmatory soil sampling effort is being performed as part of the AFCEE Extended Bioventing project. In addition, an ongoing supplemental remedial investigation/feasibility study (SRI/FS) which considers Site ST35, as well as, site groundwater (which is included in OU5 of the NPL site), is being conducted through a separate contract being performed by Parsons ES (1996) for AFCEE and ASC/EMR.

SECTION 2

SITE DESCRIPTION

AFP PJKS is located on 464 acres of land in the foothills of the Colorado Front Range, northwest of the town of Waterton, and 20 miles southwest of the city of Denver. AFP PJKS is surrounded by approximately 4,700 acres of land owned by the Lockheed Martin Company (formerly Martin-Marietta), the plant operator. From 1956 until the present, AFP PJKS activities have consisted primarily of missile assembly, engine testing, and research and development.

2.1 SITE LOCATION AND HISTORY

The OTL area is located in the southeastern portion of AFP PJKS and has been designated as OU6. Figure 2.1 is a layout of the OTL area. Three potential source areas for contamination within OU6 have been identified and investigated under the Air Force IRP. These sites are Site ST35, the oil leak from the former heating oil UST (the subject of this plan); Site OT09, the open detonation/open burning pit; and Site SS52, a cavitette, and associated piping and leachfield. The former UST that contained number 2 heating fuel was located along the east side of Building T-26 (Figure 2.1). In 1985, a leak was detected in the UST. The volume of the leak was estimated to be between 600 and 1,000 gallons, based on tank inventory measurements (ES, 1992).

Discovery of the release prompted removal of the tank and investigations of the areal extent of soil and groundwater contamination. The tank, which was buried 3 feet below ground surface (bgs) and surrounded by an open-bottomed concrete vault, was removed in November 1985 by Martin Marietta. A rupture in the tank measuring approximately 0.25-inch in diameter was observed at the southern end of the tank bottom during removal (ES, 1992).

2.2 TOPOGRAPHY, HYDROLOGY, GEOLOGY AND HYDROGEOLOGY

2.2.1 Topography and Surface Hydrology

The topography of AFP PJKS is primarily a central valley separating linear ridges to the east and rugged irregular mountains to the west. The plant is located west of the Dakota Sandstone hogback, which is a north-northwest/south-southeast trending exposure of uplifted sandstone that separates the foothills topography to the west from the plains to the east. AFP PJKS is dissected by the drainages of East and West Forks of Brush Creek. The East Fork of Brush Creek contains water year round, and the West Fork of Brush Creek is an intermittent stream. At its closest point, the West Fork

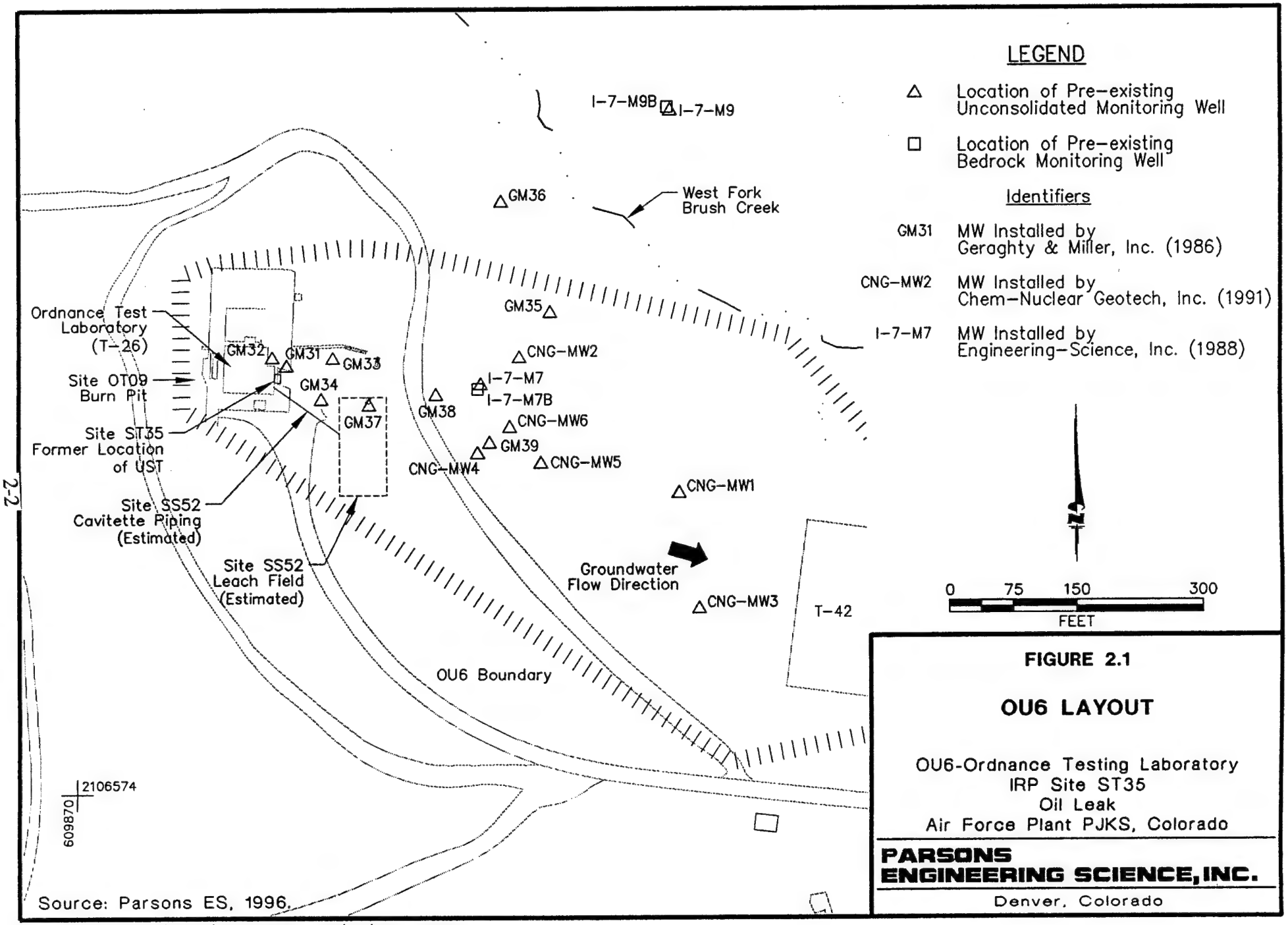

FIGURE 2.1

OU6 LAYOUT

OU6-Ordnance Testing Laboratory
IRP Site ST35
Oil Leak
Air Force Plant PJKS, Colorado

PARSONS ENGINEERING SCIENCE, INC.
Denver, Colorado

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of Brush Creek passes to the northwest of the OTL at a distance of more than 400 feet (Figure 2.1).

2.2.2 Geology

The geology beneath the OTL is characterized by fill material and Quaternary alluvial deposits overlying a thin, weathered, sandstone bedrock zone of the Fountain Formation. Fill and alluvium thicknesses range from approximately 0 to 39 feet beneath OU6. The alluvium is generally poorly sorted, but the basal section contains locally discontinuous, moderately well-sorted sands. The weathered bedrock is usually less than 10 feet thick, and forms a more permeable veneer overlying well-cemented Fountain Formation sandstones. The alluvium thickens over a buried paleochannel incised into the bedrock surface, which appears to trend eastward from Building T-26.

2.2.3 Hydrogeology

The water table beneath the OTL is generally coincident with the top of the weathered sandstone Fountain bedrock at a depth of approximately 20 to 25 feet bgs. The weathered bedrock zone is generally less than 10 feet thick, and is more permeable than the underlying, unweathered Fountain Formation (Geraghty & Miller, Inc., 1986). Groundwater flow within the alluvium/weathered bedrock is southeasterly toward West Fork of Brush Creek. Limited hydraulic conductivity data for the area indicate alluvial transmissivities in the range of 50 to 160 gallons per day per foot (gpd/ft), and a groundwater flow velocity of approximately 1 to 3 feet per day (ft/day). The southeasterly trending paleochannel described above appears to be a preferential migration pathway for alluvial groundwater.

The upper Fountain Formation hydrogeologic system, which underlies the alluvium and weathered bedrock, appears to be largely unconfined, and forms a single upper aquifer with the overlying alluvium. At greater depths, groundwater in the bedrock aquifer occurs under both confined and partially-confined conditions. The locations of east-west and north-south hydrogeologic cross-sections for OU6 are shown on Figure 2.2 and the cross-sections are provided at Figures 2.3 and 2.4.

2.3 PREVIOUS INVESTIGATIONS

2.3.1 1985 Geraghty & Miller, Inc. Investigations

Following removal of the heating oil UST in 1985, Geraghty & Miller, Inc. (1986) collected soil samples and installed nine groundwater monitoring wells in the OTL area. Findings indicated residual hydrocarbons in the soil, and downgradient migration of a free-phase product plume of heating oil on the groundwater to a distance approximately 115 feet east of the former UST (Figure 2.5). On the basis of the Geraghty & Miller 1985 field investigation, heating oil contamination was suspected to have migrated approximately 250 feet east from the source area through unconsolidated deposits.

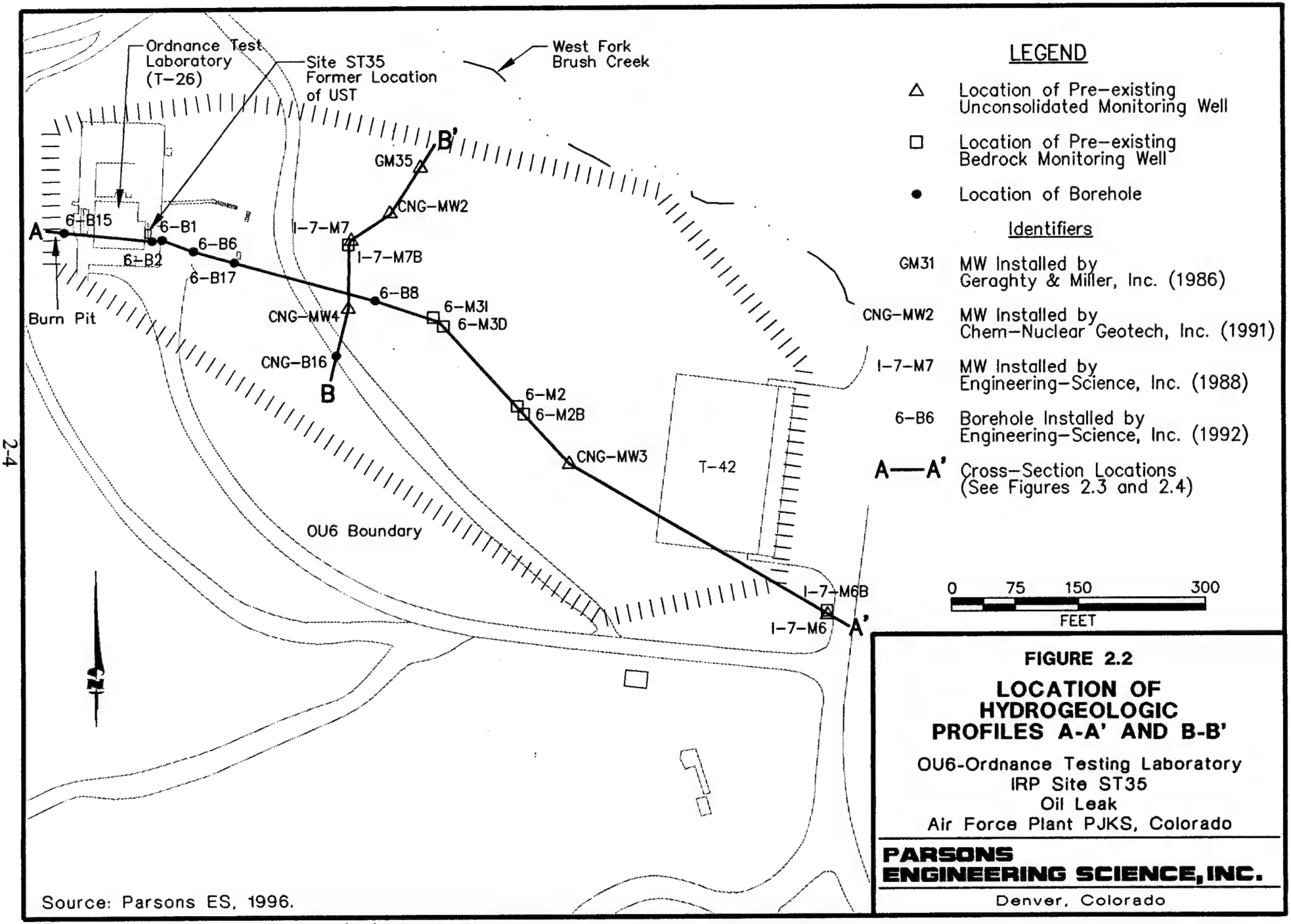

FIGURE 2.2

LOCATION OF HYDROGEOLOGIC PROFILES A-A' AND B-B'

OU6-Ordnance Testing Laboratory
IRP Site ST35
Oil Leak
Air Force Plant PJKS, Colorado

PARSONS ENGINEERING SCIENCE, INC.

Denver, Colorado

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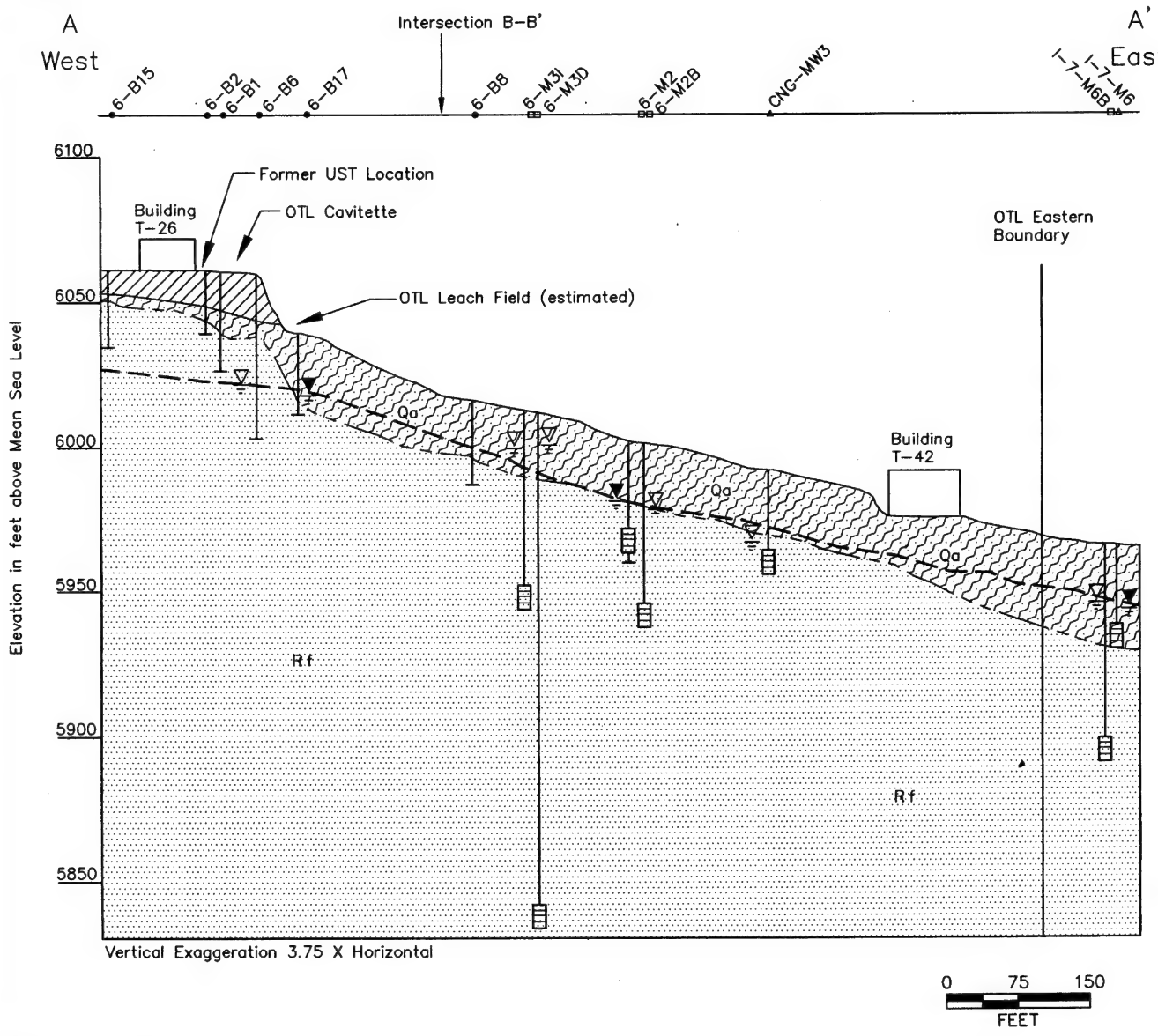

LEGEND

- • 6–B15 — Soil Borehole Location and Identifier
- ▵ I–7–M6 — Unconsolidated Monitoring Well Location and Identifier
- ▫ 6–M2B — Bedrock Monitoring Well Location and Identifier
- Screened Interval of Monitoring Well
- Fill Material; Consists of silt and sand, sm clay, pebbles & cobbles.
- Qa — Alluvium/Colluvium; Consists of silt and sand, tr–sm clay.
- Rf — Fountain Formation
- Unconsolidated and Bedrock Groundwater Level, Respectively;
- Dashed Where Inferred
- Geologic Contact; Dashed where Inferred

FIGURE 2.3

HYDROGEOLOGIC CROSS-SECTION A-A'

OU6-Ordnance Testing Laboratory
IRP Site ST35
Oil Leak
Air Force Plant PJKS, Colorado

PARSONS ENGINEERING SCIENCE, INC.
Denver, Colorado

Source: Parsons ES, 1996.

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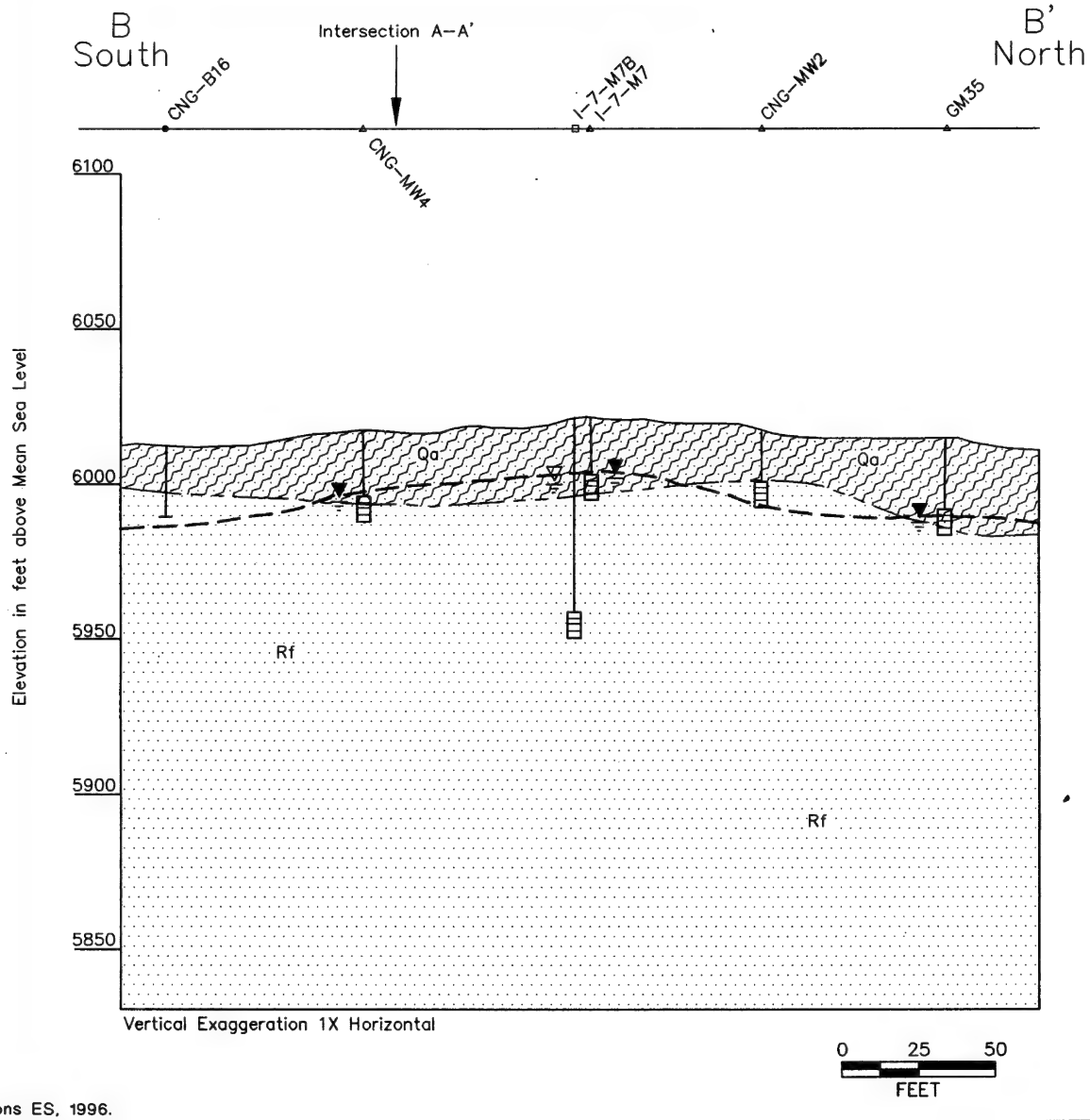

LEGEND

- • CNG–B16 Soil Borehole Location and Identification
- ▵ I–7–M7 Alluvial Monitoring Well Location and Identification
- ▫ I–7–M7B Bedrock Monitoring Well Location and Identification
- Screened Interval of Monitoring Well
- Qa — Alluvium/Colluvium; Consists of silt and sand, tr–sm clay.
- Rf — Fountain Formation
- Unconsolidated and Bedrock Groundwater Level, Respectively;
- Dashed where Inferred
- Geologic Contact; Dashed where Inferred

FIGURE 2.4

HYDROGEOLOGIC CROSS-SECTION B-B'

OU6-Ordnance Testing Laboratory
IRP Site ST35
Oil Leak
Air Force Plant PJKS, Colorado

PARSONS ENGINEERING SCIENCE, INC.
Denver, Colorado

Source: Parsons ES, 1996.

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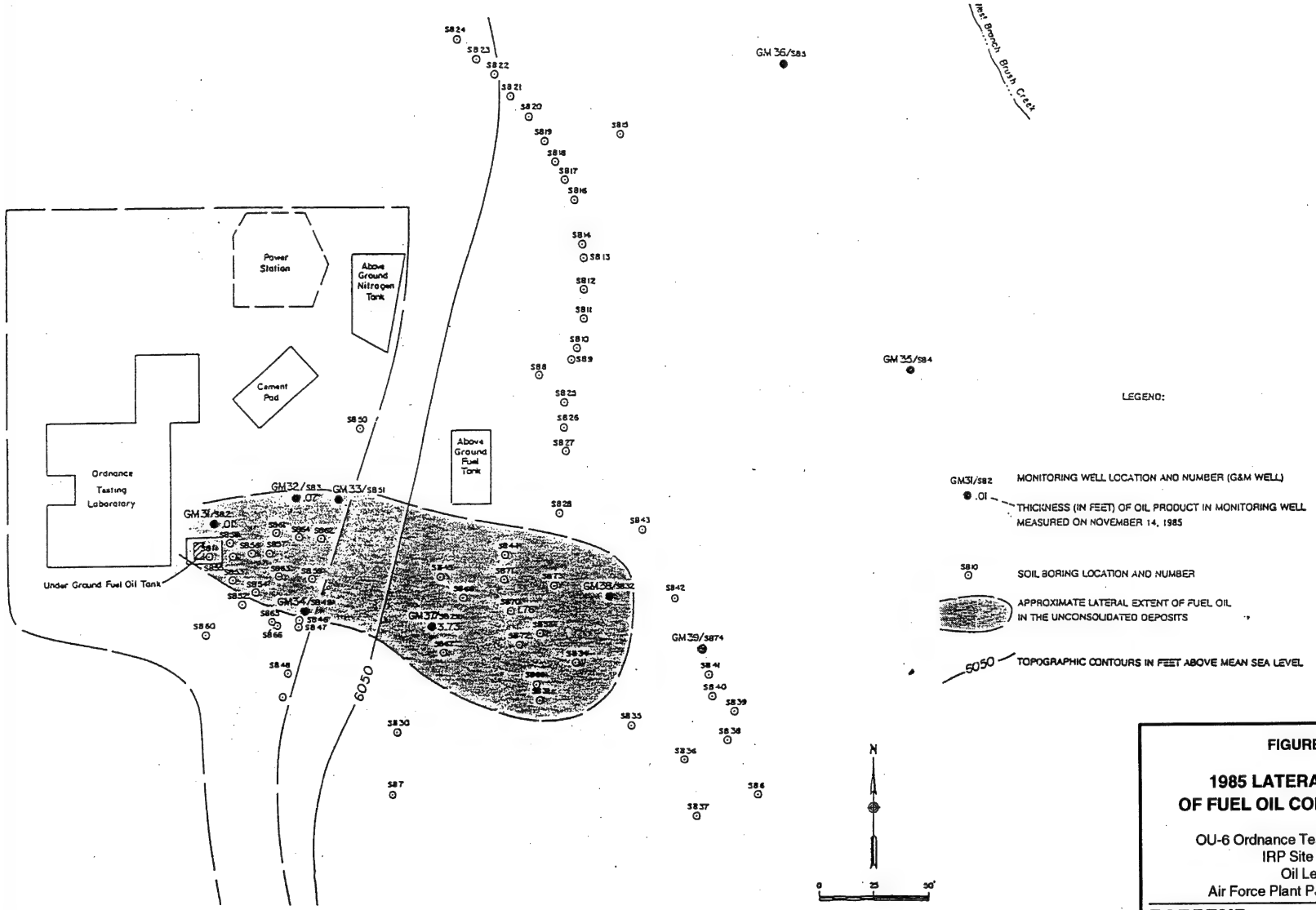


Source: Geraghty & Miller, Inc., 1986.

FIGURE 2.5

1985 LATERAL EXTENT OF FUEL OIL CONTAMINATION

OU-6 Ordnance Testing Laboratory
IRP Site ST35
Oil Leak
Air Force Plant PJKS, Colorado

PARSONS ENGINEERING SCIENCE, INC.
Denver, Colorado

2.3.2 1987 Engineering-Science, Inc. Investigations

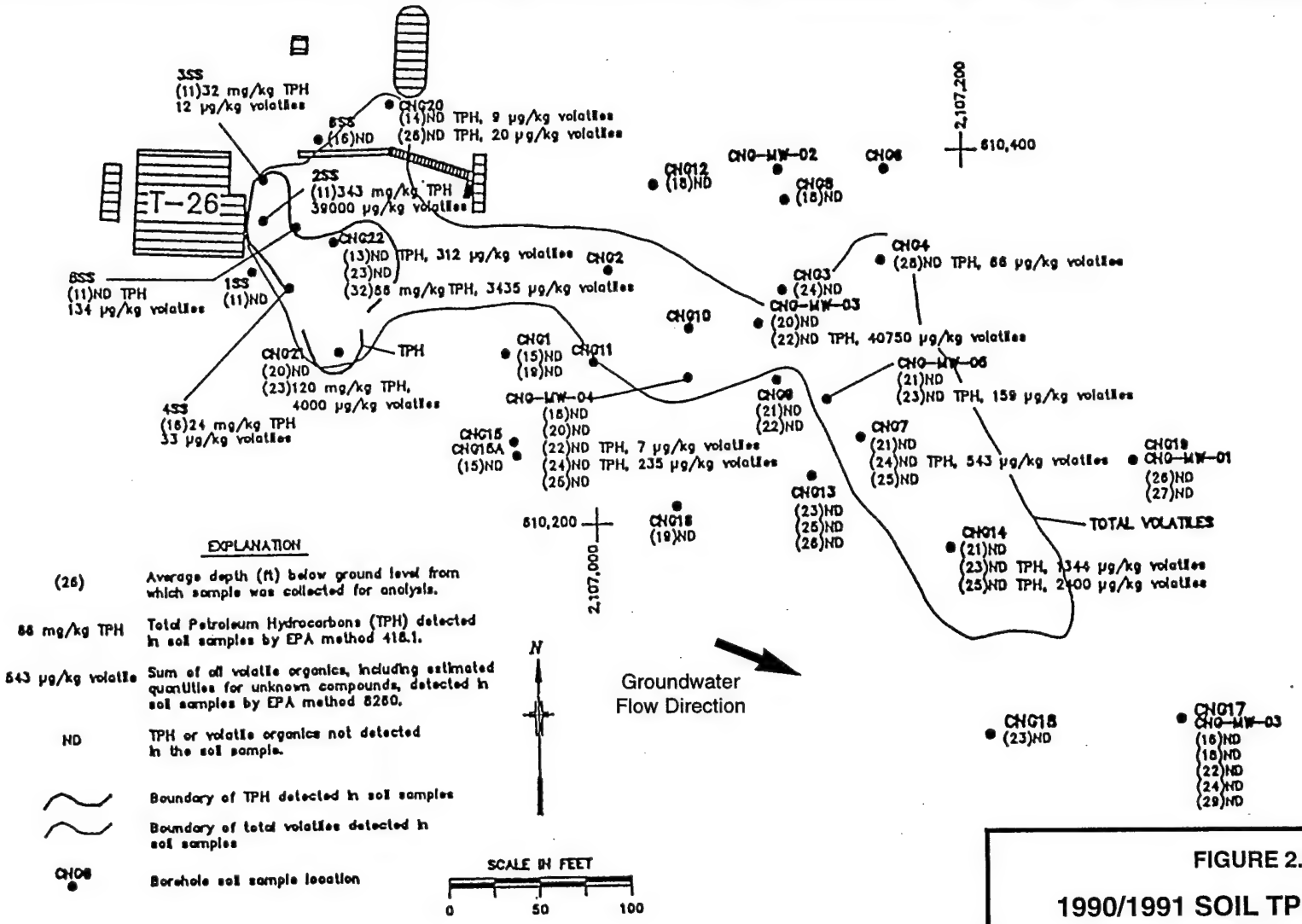
In 1987, ES (1988) installed two additional monitoring wells (I-7-M7 and I-7-M7B) as part of the IRP Phases II and IVA investigations (Figure 2.1). Analytical results from groundwater sampled from these two wells and seven of the Geraghty & Miller wells indicated that benzene, toluene, ethylbenzene, xylenes (BTEX), and naphthalene were present in wells downgradient from Site ST35. Benzene was detected in well GM-39, 250 feet from the source area (Figure 2.1), at concentrations exceeding the maximum contaminant level (MCL) of 5 micrograms per liter (µg/L). Approximately 2 feet of free product was discovered at MW GM37 during the December 1987 investigation (ES, 1988).

2.3.3 1990-1991 Chem-Nuclear Geotech, Inc. Investigations

Chem-Nuclear Geotech, Inc., (1991) performed investigations to further define the extent of soil and groundwater contamination and to characterize the hydrogeology at the OTL during 1990 and 1991. These investigations included a soil gas survey, drilling 26 boreholes, and installing six additional monitoring wells. Based on analytical results for soil samples collected from the boreholes, and subsequent rounds of groundwater sampling, fuel-related contaminants appeared to be confined to a thin interval of alluvium deposited at the erosional bedrock contact. Soil and groundwater sampling results also indicated that the more competent bedrock of the Fountain Formation had not been impacted by contamination from the leaking UST. The distribution of hydrocarbon compounds has been confined within the erosional paleochannel (Chem-Nuclear Geotech, Inc., 1991).

During the Chem-Nuclear Geotech investigations, 50 soil samples were analyzed for total recoverable petroleum hydrocarbons (TRPH), volatile organic compounds (VOCs), and semivolatile organic compounds (SVOCs). TRPH were detected in unsaturated soils at a maximum concentration of 343 milligrams per kilogram (mg/kg) at 11 feet bgs, and were limited to soils in the immediate vicinity of the former UST. The majority of the analytes detected were relatively heavy-molecular-weight, less volatile compounds, including 1-ethyl-4-methylbenzene, 1-methylnaphthalene, 2-methylnaphthalene, naphthlene, n-nonane, 1,2,3,5-tetramethylbenzene, and 1,3,5-trimethylbenzene, which are commonly associated with petroleum hydrocarbons. BTEX compounds detected in soils (and their maximum concentrations) were toluene (18 micrograms per kilogram [µg/kg]), xylenes (2,000 µg/kg), and ethylbenzene (35 µg/kg). Other VOCs detected included acetone (94 µg/kg) and methyl ethyl ketone (MEK) (2,900B µg/kg). The "B" qualifier indicates that the analyte was also detected in the method blank. Benzene was not detected in any of the soil samples. Figure 2.6 summarizes the soil TRPH and VOC results from the Chem-Nuclear Geotech investigation.

Downgradient from the former UST, fuel-related contaminants were detected in soil samples from CNG14, 420 feet from the suspected source area, but were confined to the thin smear zone at approximately 24 feet bgs in largely saturated alluvial material within the paleochannel. During the investigation, free product, measuring 0.3 foot thick, was found on the water table surface, approximately 20 feet bgs, at MW GM37.



Source: Chem-Nuclear Geotech, Inc., 1991.

FIGURE 2.6

1990/1991 SOIL TPH AND VOC ANALYTICAL RESULTS

OU6-Ordnance Testing Laboratory
IRP Site ST35
Oil Leak
Air Force Plant PJKS, Colorado

PARSONS ENGINEERING SCIENCE, INC.
Denver, Colorado

Contaminant migration at the site appears to have resulted from product movement along the water table within the bedrock paleochannel.

Results of multiple rounds of groundwater sampling defined a dissolved fuel hydrocarbon plume extending approximately 560 feet downgradient from the former UST location. Dissolved petroleum hydrocarbon constituents detected in alluvial groundwater (and their maximum concentrations) included benzene (110 µg/L), toluene (190 µg/L), ethylbenzene (300 µg/L), and xylenes (780 µg/L). The maximum concentration of total petroleum hydrocarbons (TPH) was 3.9 milligrams per liter (mg/L). Trichloroethene (TCE), trans-1,2-dichloroethene (DCE), vinyl chloride, and naphthlene also were detected in groundwater samples at maximum concentrations of 25 µg/L, 100 µg/L, 16 µg/L, and 3 µg/L, respectively (Chem-Nuclear Geotech, Inc., 1991).

2.3.4 1992 Engineering-Science, Inc. Investigations

Additional investigations were performed at the OTL former UST site in 1992 by ES (ES, 1992a; and, Parsons ES, 1996). The investigation included drilling and sampling 29 boreholes and installing and sampling five groundwater monitoring wells. In addition, components for a 1-year bioventing pilot test, including one air injection vent well (VW) and five soil gas monitoring points (MP1 through MP4 and a background MP), were installed during the 1992 investigations. As part of the 1992 investigations, soil samples were collected and analyzed for VOCs, SVOCs, and total extractable petroleum hydrocarbons (TEPH).

Five VOCs were detected in the 19 subsurface soil samples collected from boreholes in the vicinity of the former UST. Table 2.1 summarizes the analytical results for VOCs in subsurface soil, and Figure 2.7 shows the distribution of detected VOCs. VOCs detected include ethylbenzene, total xylenes, 2-butanone, 2-hexanone, and methylene chloride. Concentrations detected ranged from 6 µg/kg to 1,200 µg/kg for 2-butanone; 1,500 µg/kg for 2-hexanone; 3 µg/kg to 3,000 µg/kg for ethylbenzene; 260 µg /kg to 300 µg/kg for methylene chloride; and 1,000 µg/kg to 6,600 µg/kg for total xylenes. Contamination in the vicinity of the former UST was detected only in samples collected from soil boreholes 6-B2 and 6-B3 (Figure 2.7). The higher concentrations of these analytes were found in samples from 6-B2, and generally increased with depth (Figure 2.7). Methylene chloride, 2-hexanone, and total xylenes were detected only in samples from borehole 6-B2.

Nine soil samples were collected and analyzed for TEPH by Method SW8015, modified for diesel fuel. The TEPH results are presented in Table 2.1 and in Figure 2.8. Miscellaneous hydrocarbons (C7-C1O) were detected at concentrations of 20 mg/kg to 4,880 mg/kg. As shown in Figure 2.8, the most significant TEPH contamination was detected in samples collected in the immediate vicinity of the former UST (soil boreholes 6-B2 and 6-B3); however, some TEPH contamination was also detected approximately 100 feet north of the former UST location (soil boreholes 6-B25, 6-B26, and 6-B27), but is not thought to be the result of the UST oil leak.

TABLE 2.1
SUMMARY OF ORGANIC COMPOUNDS IN SOIL [a/]
OU6 - ORDNANCE TESTING LABORATORY, IRP SITE ST35, OIL LEAK
AIR FORCE PLANT PJKS, COLORADO

Sampling Location [c/]	Date Collected	Sample Interval (feet bgs)[d/]		Analyte (units)[b/] 2-Butanone (µg/kg)	2-Hexanone (µg/kg)	Acetone (µg/kg)	Benzene (µg/kg)	Toluene (µg/kg)	Ethyl-benzene (µg/kg)	Total Xylenes (µg/kg)	Methylene Chloride (µg/kg)	Tetra-chloro-ethene (µg/kg)	Chloroform (µg/kg)	TEH (mg/kg)
Oil Leak - Soil														
6-B2 (VW)	05-Aug-92	11.00	11.50	1100	1500	1500 U[e/]	740 U	740 U	560	1100	300	740 U	740 U	929
6-B2 (VW)	05-Aug-92	16.50	17.00	1200	1500	1400 U	740 U	740 U	780	1000	300	740 U	740 U	167
6-B2 (VW)	05-Aug-92	19.00	19.50	980	1500 U	1500 U	690 U	690 U	3000	6600	260	690 U	690 U	4880
6-B3 (MP2)	06-Aug-92	14.00	14.50	6	12 U	28 U	1 U	1 U	5	6 U	14 U	2 U	1 U	76
6-B3 (MP2)	06-Aug-92	16.00	16.50	7	12 U	19 U	1 U	1 U	7	6 U	12 U	2 U	1 U	70
6-B3 (MP2)	06-Aug-92	20.00	20.50	19 U	11 U	16 U	1 U	1 U	3	6 U	15 U	2 U	1 U	223
6-B5 (MP4)	06-Aug-92	20.00	21.50				1 U	1 U	1 U	1 U				
6-B5 (MP4)	06-Aug-92	26.50	27.00				1 U	1 U	1 U	1 U				
6-B6	07-Aug-92	32.00	32.50				1 U	1 U	1 U					
6-B6	07-Aug-92	38.00	38.50				1 U	1 U	1 U	1 U				
6-B7	03-Sep-92	7.00	7.50				1 U	1 U	1 U	1 U				
6-B7	07-Aug-92	14.50	15.00				1 U	1 U	1 U	1 U				
6-B7	07-Aug-92	16.50	17.00				1 U	1 U	1 U	1 U				
6-B8	07-Aug-92	16.50	17.00				1 U	1 U	1 U	1 U				
6-B8	07-Aug-92	22.50	23.00				1 U	1 U	1 U	1 U				
6-B26	03-Sep-92	19.50	20.00				1 U	1 U	1 U	1 U				
6-B26	03-Sep-92	21.00	21.50				1 U	1 U	1 U	1 U				
6-B27	14-Sep-92	16.00	18.00	1 U	11 U	9 U	1 U	1 U	1 U	5 U	5 U	2 U	1 U	20
6-B28	14-Sep-92	18.00	20.00	0.05 R[f/]			0.025 U	0.025 U				0.025 U	0.025 U	20

Source: Parsons ES, 1996

[a/] Volatile organic compounds detected using USEPA Method SW5030/SW8240; total extractable hydrocarbons (TEH) detected using USEPA Method SW8015/SW3550.

[b/] Units are in micrograms per kilogram (µg/kg) for all, except TEH results which are in milligrams per kilogram (mg/kg).

[c/] Initial identifier gives the borehole designation; identifier in paretheses gives bioventing system component; VW=vent well borehole, MP=monitoring point borehole.

[d/] Feet below ground surface.

[e/] U=Analyte not detected in sample. Number shown represents the method detection limit.

[f/] R=Rejected value.

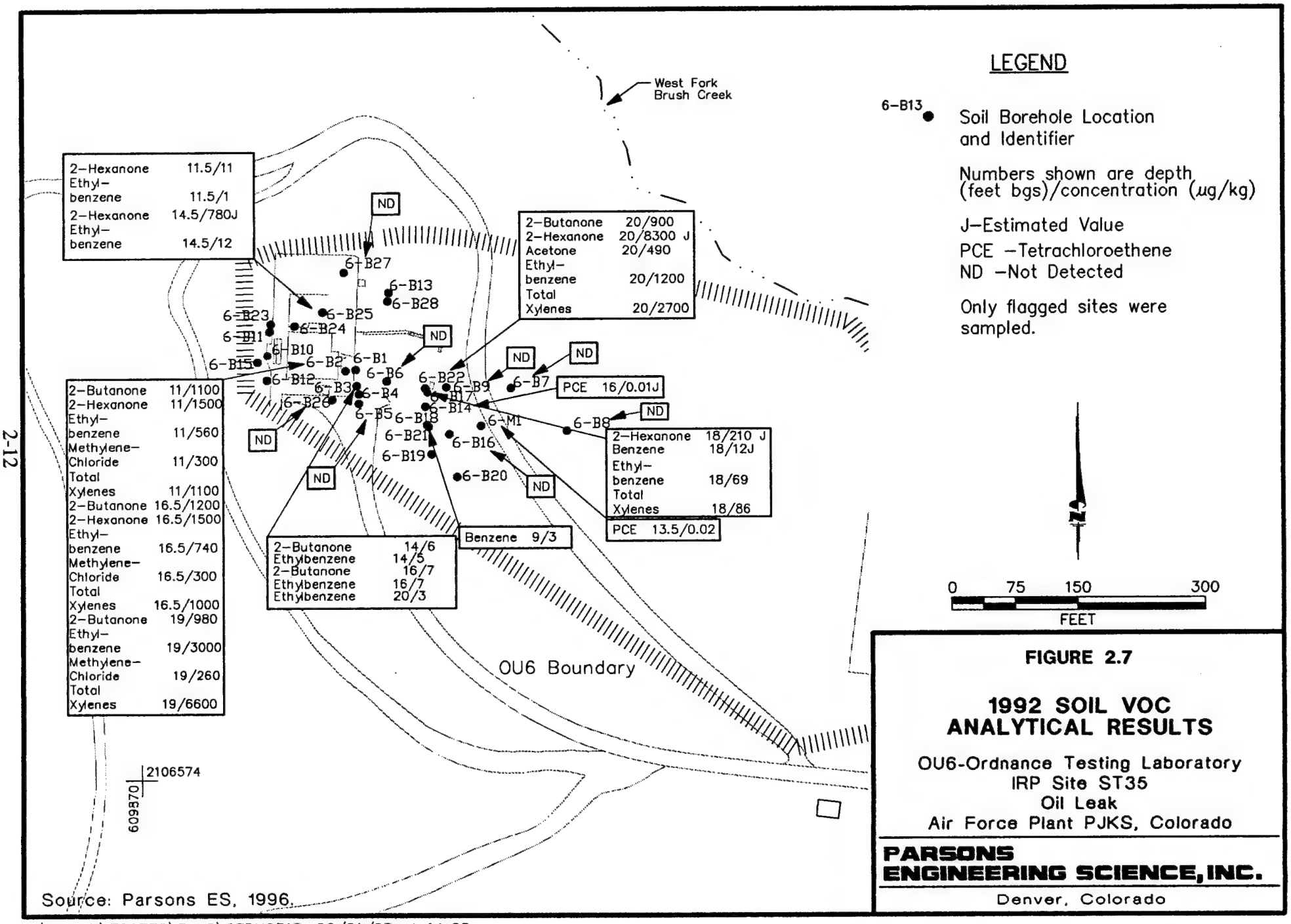


FIGURE 2.7

1992 SOIL VOC ANALYTICAL RESULTS

OU6-Ordnance Testing Laboratory
IRP Site ST35
Oil Leak
Air Force Plant PJKS, Colorado

PARSONS ENGINEERING SCIENCE, INC.

Denver, Colorado

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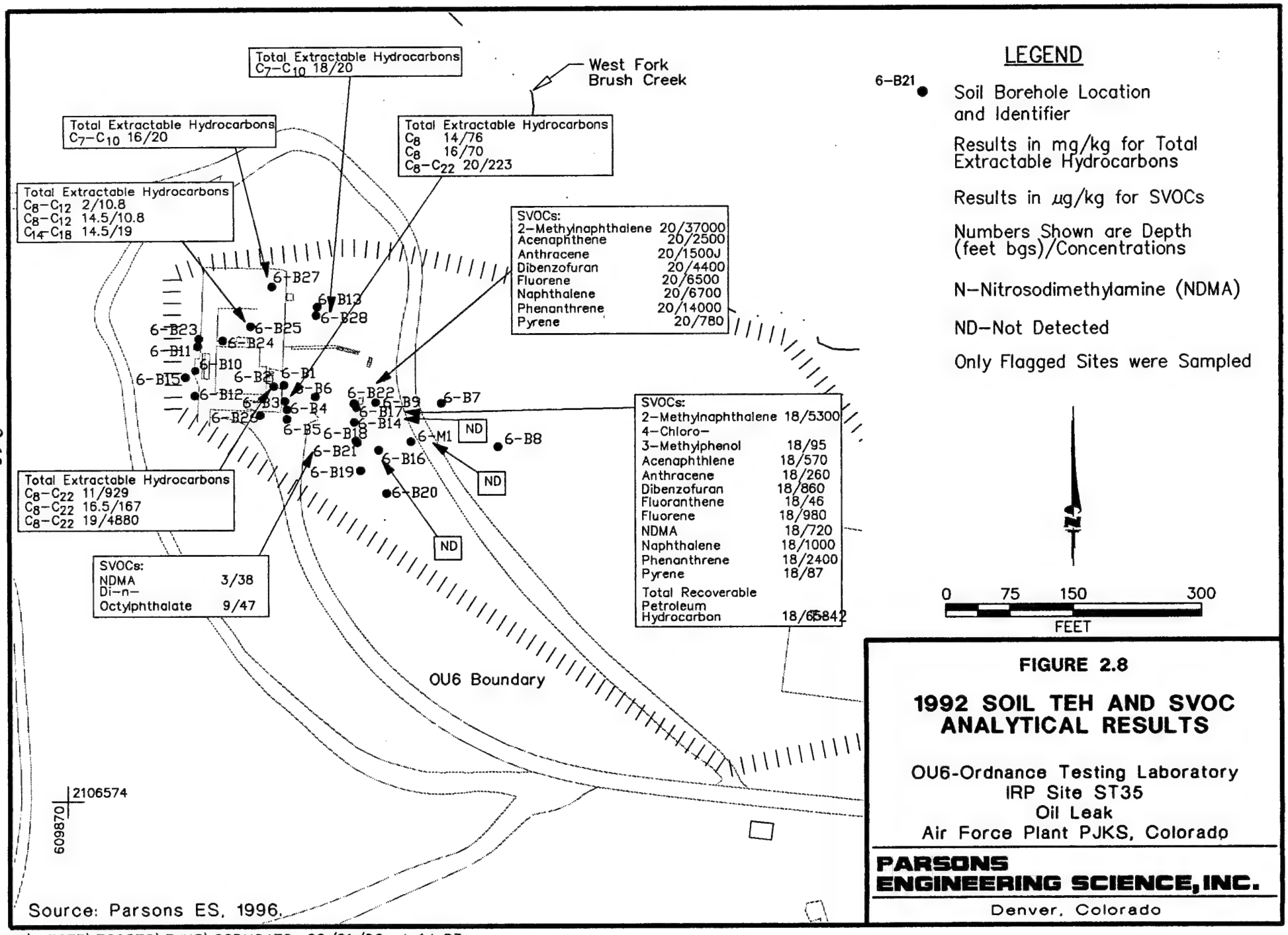

FIGURE 2.8

1992 SOIL TEH AND SVOC ANALYTICAL RESULTS

OU6-Ordnance Testing Laboratory
IRP Site ST35
Oil Leak
Air Force Plant PJKS, Colorado

PARSONS ENGINEERING SCIENCE, INC.

Denver, Colorado

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Subsurface soil samples collected in the immediate vicinity of the former UST were not analyzed for SVOCs, but SVOC analysis by EPA Method SW3520/SW8270 was performed on samples collected east of the former heating oil UST. Figure 2.8 shows the sample locations and SVOC results. Based on information provided in the supplemental RI/FS (1996), the SVOC contamination is attributed to former IRP Site SS52, the cavitette/leach field.

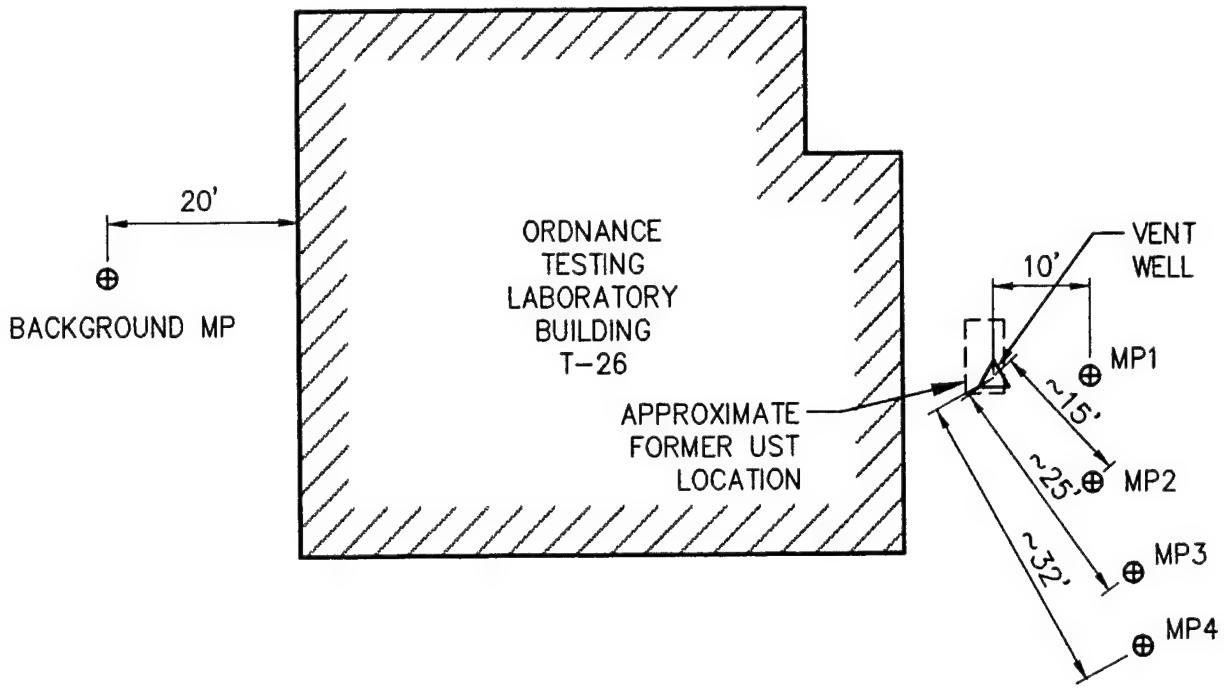
2.3.5 Bioventing Pilot Test

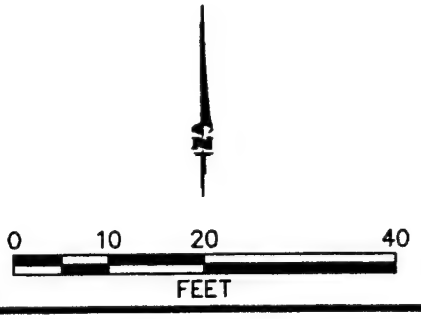
In 1992 and 1993, as part of a nationwide program established by AFCEE, a bioventing system was installed by ES at the OTL UST site to assess the potential of bioventing to remediate the hydrocarbon contamination identified in the vadose zone soils. The details of this installation are described in the bioventing pilot test work plan (ES, 1992). Preliminary pilot test and analytical results are presented in the interim bioventing pilot test letter results report (ES, 1993a), and 1-year test results are summarized in a 5 May 1995 memorandum (AFCEE, 1995). Objectives of the pilot test were to inject air into the subsurface to supply the soil with oxygen, determine the rate at which indigenous microorganisms will degrade fuel when stimulated by oxygen-rich soil gas, and to evaluate the potential for sustaining these rates of biodegradation until fuel contamination was remediated to concentrations below regulatory standards.

During the 1992 ES investigation, one bioventing air injection VW and five vapor monitoring points (MPs), including one background MP were installed in the vicinity of the former UST. Six soil samples were collected from the VW and MP2 boreholes and analyzed for BTEX, TEPH, nutrients, moisture, and grain-size analyses. In addition, one soil gas sample was collected from the VW and analyzed for BTEX and total volatile hydrocarbons (TVH). Soil gas samples could not be collected from the MPs because of high water table conditions which flooded the MP screens. VW and MP locations are shown on Figure 2.9, and initial soil and soil gas analytical results are presented in Table 2.2.

Initial soil gas testing at the VW indicated depleted oxygen concentrations and high TVH concentrations, and suggested that air injection would oxygenate contaminated soils and enhance biodegradation of residual petroleum hydrocarbons by naturally occurring soil microbes. Based on these initial sampling results, a blower system was installed at the site in May 1993 to inject ambient air (oxygen) into the contaminated soil as part of the 1-year pilot test.

After installation, the pilot-scale bioventing system was operated and monitored for a total of approximately 14 months (from May 1993 to July 1994) at which time final respiration tests were conducted and soil gas samples were collected and analyzed. Soil samples were collected and analyzed approximately 4 months later, in November 1994, during a separate site visit. The soil gas and soil results from these samples are presented in Table 2.2. The objective of the soil sampling effort was to determine relative changes in TPH and BTEX concentrations following the period of extended bioventing. Analytical results for soil samples indicate that significant reductions in TPH and BTEX compounds had taken place within the estimated 40- to 50-foot treatment radius of the VW (Table 2.2). Soil gas sampling results were inconclusive





LEGEND

⊕ MONITORING POINT

△ VENT WELL

FIGURE 2.9

VENT WELL/MONITORING POINT LOCATIONS

OU6-Ordnance Testing Laboratory
IRP Site ST35
Oil Leak
Air Force Plant PJKS, Colorado

PARSONS ENGINEERING SCIENCE, INC.

Denver, Colorado

TABLE 2.2
INITIAL AND 14-MONTH SOIL GAS AND SOIL ANALYTICAL RESULTS
OU6 - ORDNANCE TESTING LABORATORY, IRP SITE ST-35, OIL LEAK
AIR FORCE PLANT PJKS, COLORADO

Analyte (Units) [a]	Sample Locations-Depth (feet below ground surface)	
	VW 5-20	
Soil Gas Hydrocarbons	Initial [b]	14-Month [c]
TVH (ppmv)	2300	11
Benzene (ppmv)	8.2	<0.003
Toluene (ppmv)	8.8	0.004
Ethylbenzene (ppmv)	6.5	0.026
Xylenes (ppmv)	14	0.07

	VW-11		VW-16.5		VW-19		MP2-14		MP2-16		MP2-19	
Soil Hydrocarbons	Initial [d]	14-Month [e]	Initial	14-Month	Initial	14-Month	Initial	14-Month	Initial	14-Month	Initial	14-Month
TPH (mg/kg)	929	105	166	108	4880	17.1	76	370	70	<12.2	223	152
Benzene (mg/kg)	<0.740	<0.05	<0.740	<0.05	<0.690	<0.05	<0.001	<0.05	<0.001	<0.05	<0.001	<0.05
Toluene (mg/kg)	<0.740	<0.05	<0.740	<0.05	<0.690	<0.05	<0.001	<0.05	<0.001	<0.05	<0.001	<0.05
Ethylbenzene (mg/kg)	0.56	<0.05	0.78	<0.05	3	<0.05	0.005	<0.05	0.007	<0.05	0.003	<0.05
Xylenes (mg/kg)	1.1	<0.1	1	<0.1	6.6	<0.1	<0.006	<0.1	<0.006	<0.1	<0.006	<0.1
Moisture (%)	NS [f]	11.1	NS	14.8	8.41	4.9	NS	15.1	NS	18.3	NS	7.2

[a] TVH=total volatile hydrocarbons by USEPA Method TO-3; ppmv = parts per million, volume per volume;
TPH=total petroleum hydrocarbons, including total extractable petroleum hydrocarbons (TEPH) by USEPA Method SW8015/SW3550 (hydrocarbon range C_8-C_{22}), and total recoverable petroleum hydrocarbons (TRPH) by USEPA Method 418.1; mg/kg = milligrams per kilogram.

[b] Initial soil gas samples collected on December 9, 1992. Bioventing system operation did not begin until May 1993.

[c] Final soil gas samples collected on July 10, 1994 following 14 months of bioventing system operation.

[d] Initial soil samples collected on August 5-6, 1992. Initial soil samples analyzed for TEPH.

[e] Final soil samples collected on November 7, 1994. Final soil samples analyzed for TRPH.

[f] NS=not sampled.

because soil gas could only be measured at the VW due to high groundwater levels in the MPs. Final respiration testing showed TPH in the soil were being degraded at a rate of 890 to 1,900 mg of fuel per kg of soil per year (mg/kg/yr). Table 2.3 summarizes the calculated respiration and fuel biodegradation rates for various times during pilot testing. Based on soil analytical results, TPH concentrations were reduced more than 80 percent during the 14-month extended bioventing test, from an average concentration of 1,060 mg/kg to 127 mg/kg. Total BTEX were reduced from an average concentration of approximately 2,180 µg/kg to below method detection limits during the 14-month period of bioventing system operation.

2.3.6 Results Summary

Based on the results of the previous investigations, the former heating oil UST has been identified as the probable source of most of the petroleum hydrocarbon contamination within OU6. Soil sample results from the 1985 through 1992 investigations indicated the highest concentrations of TPH and other fuel-related hydrocarbons occurred in vadose zone soils in the immediate vicinity of the former UST. Based on this information, a bioventing pilot-scale system was installed at the location of the former UST, and after 14 months of system operation, significant reductions in TPH and BTEX contamination in site soils was evident. Figure 2.10 shows the extent of TPH and VOC soil contamination at the former OTL UST, and the areas suspected as exceeding 250 mg/kg TPH in soils in 1992, and following bioventing treatment in 1994. While BTEX contamination in site soils has never appeared as exceeding 50 mg/kg; results of soil sampling following the bioventing pilot test indicate nondetect levels in soils in the immediate vicinity of the former UST.

It should be noted that benzene, which is not a significant constituent in heating oil, has been detected at several locations within OU6. Based on historical site information, it is believed that other fuels may have been released during former activities at the OTL, such as during acoustics testing at a former jet engine test stand located near the northeastern corner of the OTL building. As previously mentioned, TEPH also were detected at low concentrations (from 11 to 20 mg/kg) in soil samples collected from three boreholes (6-B25, 6-B27 and 6-B28) located north of the former heating oil UST (Parsons ES, 1996).

While existing data show some fuel-related contamination at other areas of the OTL, results of soil sampling in the vicinity of the former UST indicate that BTEX concentrations have been reduced to levels below CDOLE Oil Inspection Section (1995) action levels, and TPH concentrations were approaching, or had been reduced below, action levels. Based on this evidence, AFCEE recommended that the bioventing pilot-scale system continue to operate while planning for confirmation sampling.

TABLE 2.3
RESPIRATION AND FUEL BIODEGRADATION RATES
OU-6 ORDNANCE TESTING LABORATORY, IRP SITE ST-35, OIL LEAK
AIR FORCE PLANT PJKS, COLORADO

Location-Depth (feet below ground surface)	Initial (Dec. 1992) [a]			6-Month (Dec. 1993) [c]			14-Month (Jul-Aug 1994)		
	K_o (% O_2/min)	Degradation Rate (mg/kg/year)[b]	Soil Temperature (°C)	K_o (% O_2/min)	Degradation Rate (mg/kg/year)	Soil Temperature (°C)	K_o (% O_2/min)	Degradation Rate (mg/kg/year)	Soil Temperature (°C)
VW	0.0087	2,200	NS [d]	0.0022	490 [e]	NS [d]	0.0042	890 [f]	NS [d]
MP1-24	NS [g]	NC [h]	15.2	NS [g]	NC	NS [d]	0.0068	1,900 [i]	NS [d]
MP2-21.7	NS [g]	NC	15.4	NS [g]	NC	NS [d]	NS [g]	NC	NS [d]
MP3-22	NS [g]	NC	15.5	0.0036	1,000 [i]	NS [d]	NS [g]	NC	NS [d]
MP4-26.3	NS [g]	NC	15.3	NS [g]	NC	NS [d]	NS [g]	NC	NS [d]

[a] Initial respiration testing performed in December 1992, but system operation did not begin until May 1993.

[b] Milligrams of hydrocarbons per kilogram of soil per year.

[c] Assumes moisture content of the soil is average of initial and final moistures.

[d] NS = Not sampled.

[e] Average of initial and 14-month moisture values at 11', 16.5', and 19' depths used in calculating degradation rate for VW.

[f] Average of November 1994 moisture values at 11', 16.5', and 19' depths used in calculating degradation rate for VW.

[g] Oxygen utilization (respiration rates) could not be determined at these points because the screened interval was under water during testing.

[h] NC = Not calculated.

[i] Moisture result from MP2-19 in November 1994 used in calculating degradation rate for MP1 and MP3.

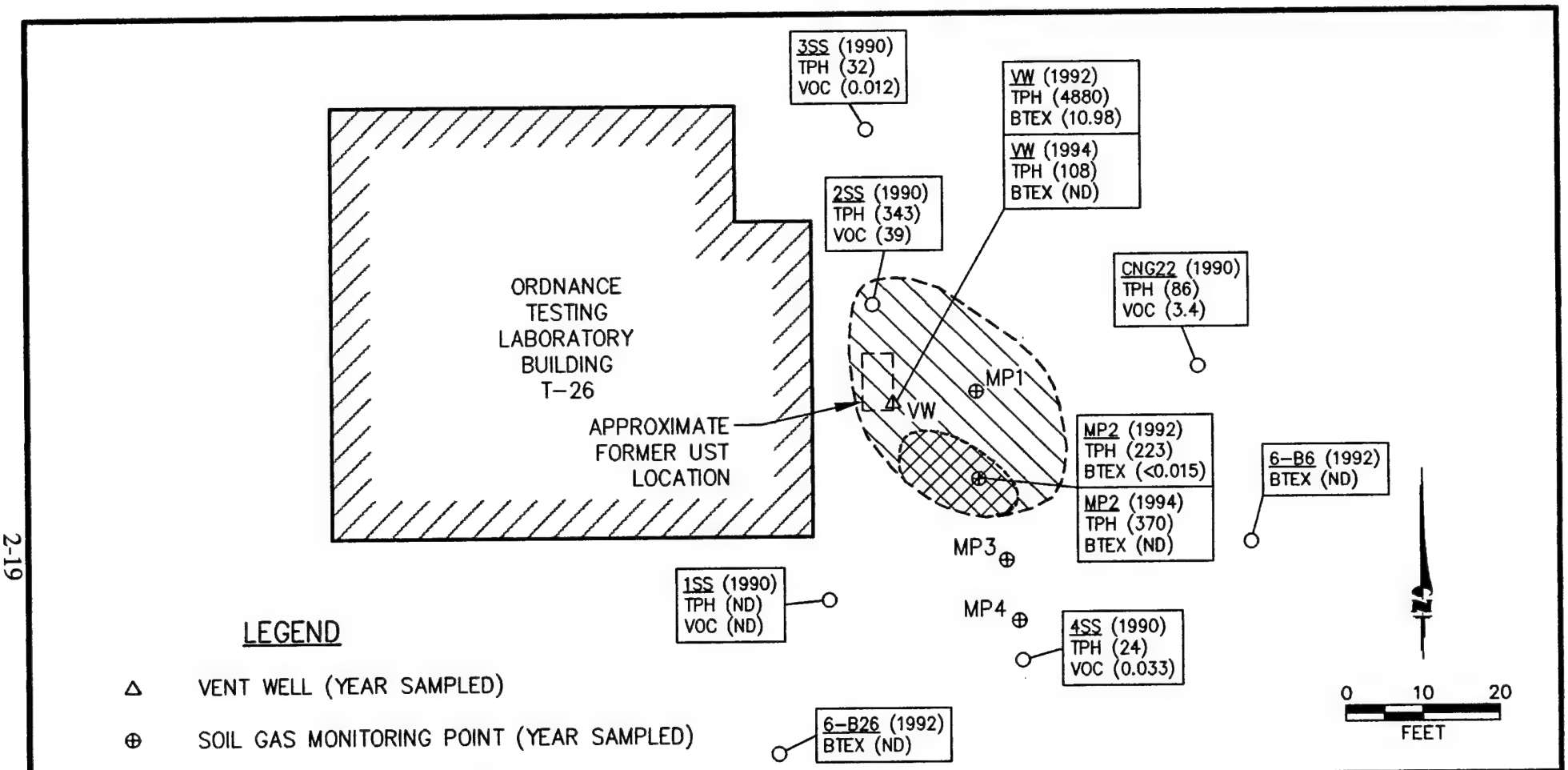


FIGURE 2.10

SUMMARY OF TPH AND VOC SOIL ANALYTICAL RESULTS

OU6-Ordnance Testing Laboratory
IRP Site ST35
Oil Leak
Air Force Plant PJKS, Colorado

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Denver, Colorado

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SECTION 3

SITE CLEANUP REQUIREMENTS

Site-specific closure requirements for the OTL former heating oil UST site have not been established because this is an interim status site under the IRP. The Colorado Department of Public Health and Environment (CDPHE) and the United States Environmental Protection Agency (USEPA) are currently negotiating an interagency agreement with the Air Force that will determine how the site will be regulated. As a result of the ongoing negotiations, confirmation soil sampling at Site ST35 represents a voluntary action.

OU6 includes two current and one former IRP sites that are potential source areas for soil and groundwater contamination. The sites include the former heating oil UST (the focus of this work plan), the open detonation/open burning pit, and a cavitette/leach field (the cavitette/leach field is no longer an IRP site). Previous investigations have identified the leaking UST as the probable source for petroleum hydrocarbon contamination. The highest concentrations of TPH and other fuel-related hydrocarbons have been detected in soils in the immediate vicinity of the former UST; however, bioventing in the former location of the UST has significantly reduced fuel-related hydrocarbon contamination in site soils. This section and Section 4 address closure sampling at the former UST study area within OU6.

3.1 SITE CHARACTERIZATION REQUIREMENTS

Because the interagency agreement among the Air Force, USEPA, and CDPHE has not been finalized, the sampling plan presented in this report is based upon generally accepted sampling protocols for fuel UST site closure soil sampling (CDOLE, 1995).

The objective of the confirmatory soil sampling is to support an NFRAP recommendation for the soils contaminated by heating oil in the immediate vicinity of the former UST, pursuant to closure of Site ST35 in OU6. This sampling plan targets only unsaturated soils above the groundwater table; groundwater contamination, whether from fuel hydrocarbons or other contaminant sources, is to be addressed under ongoing studies for OU5, Brush Creek Groundwater.

3.2 STATE SOIL CLEANUP STANDARDS

Although site-specific soil cleanup standards have not been established for Site ST35 pending negotiation of the interagency agreement, state storage tank cleanup standards are adopted as cleanup goals for fuel-contaminated soils. Storage tank cleanup standards are presented in the Storage Tank Facility Owner/Operator Guidance

Document (CDOLE, 1995). Storage tank sites formerly under the jurisdiction of the CDPHE are now under the jurisdiction of the CDOLE, Oil Inspection Section.

Cleanup standards are dependent on the beneficial use classification of the aquifer impacted or potentially impacted by soil petroleum hydrocarbon contamination. Based on known site conditions, site soils overlying OU5 groundwater would likely be classified as remedial action category level II (RAC II), an intermediate category based on potential future use of the aquifer as a potable water source. Definitions of the three RACs are summarized below.

RAC I includes petroleum contamination of:

- groundwater currently being used as a public and/or private drinking water supply;
- groundwater withdrawn by a public water supply system that is used, or is intended to be used, as drinking water;
- groundwater used incidentally or intermittently for public drinking water;
- groundwater temporarily not being used, but has been used in the past for public drinking water;
- groundwater having the potential for being used as a public drinking water supply; or,
- groundwater within 500 feet or within the zone of influence of a private drinking water-supply well.

RAC II includes petroleum contamination of:

- groundwater that has the potential for being used as a private drinking water supply; or
- groundwater not included in the RAC I designation such as petroleum contamination of groundwater not more than 500 feet from, or outside the zone of influence of, a private water well.

RAC III includes, but is not limited to, petroleum contamination of:

- groundwater not being used, and with little or no potential for being used, as a public or private drinking water supply.

Assuming a RAC II classification for OU6, contaminated soils that have impacted or have the potential to impact RAC II groundwater should be remediated to concentrations of less than or equal to 50 mg/kg total BTEX and 250 mg/kg TPH. These levels may be determined by the state to be more or less stringent based upon risk assessment and FSs (CDOLE, 1995).

SECTION 4

SITE CONFIRMATION SOIL SAMPLING AND ANALYSIS PLAN

The following SAP describes the borehole locations, sampling depths, soil sampling procedures, and analytical methods proposed to collect sufficient data to verify remediation of Site ST35 soils to CDOLE RAC II cleanup levels, and to support site closure. Sampling and laboratory testing will follow the procedures recommended in the Storage Tank Facility Owner/Operator Guidance Document (CDOLE, 1995).

As described in Section 2, Site ST35 was characterized during the 1985 through 1992 investigations. In addition, analytical results from limited soil sampling conducted following approximately 14 months of bioventing indicated substantial reductions in soil BTEX and TPH concentrations attributed to bioventing remediation. Beneath the former UST site, soil petroleum hydrocarbon contamination of the vadose zone was limited to within approximately 30 feet of the former UST and to depths between approximately 11 and 30 feet bgs. Because soil samples were collected from only two locations (the VW and MP2, designated 6-B2 and 6-B3, respectively, during the 1992 ES investigation) following bioventing treatment, Parsons ES proposes to drill and sample seven additional boreholes in the vicinity of the former UST to more completely characterize the petroleum hydrocarbon contamination remaining in soils.

4.1 DRILLING, SAMPLING, AND EQUIPMENT DECONTAMINATION

Seven boreholes will be drilled and sampled in the vicinity of the former UST at the approximate locations shown on Figure 4.1. Up to three additional boreholes may be drilled and sampled if field screening results from the first seven boreholes indicate significant contamination extending beyond the proposed sampling area. The locations of the additional boreholes would be determined in the field, and therefore are not shown on Figure 4.1. Boreholes will be advanced using a drill rig equipped with 3.25-inch inside-diameter (ID) hollow-stem augers. Soil cuttings generated during drilling will be screened with a photoionization detector (PID) and a total volatile hydrocarbon analyzer (TVHA). Those cuttings that exhibit staining, odor, or headspace readings above background levels will be placed in US Department of Transportation (DOT)-approved 55-gallon drums. The drums will be labeled with the site name, drilling date, borehole number, and depth intervals. To minimize cuttings disposal costs, cuttings showing no field evidence of contamination will be returned to the borehole from which they were generated.

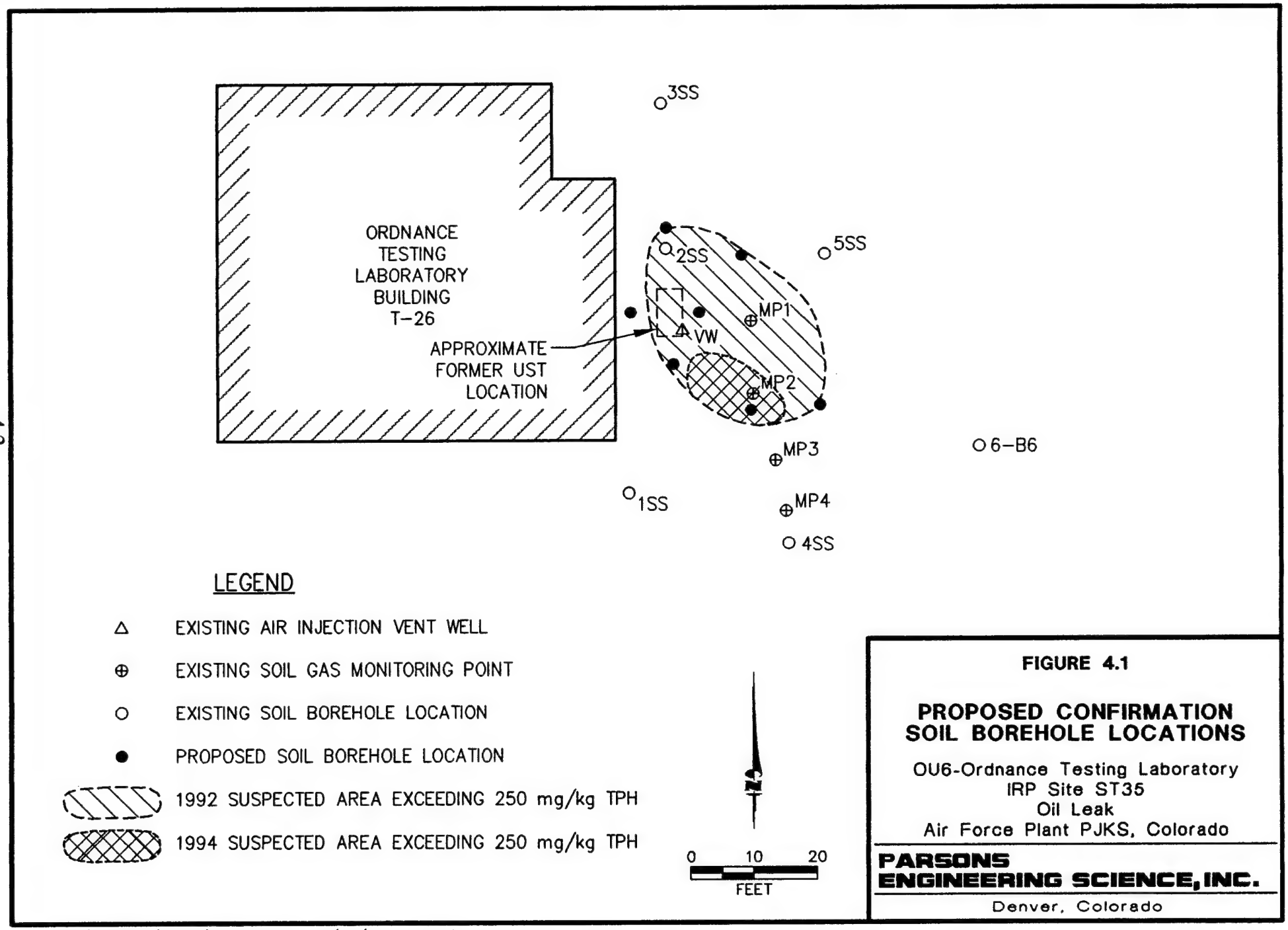

FIGURE 4.1

PROPOSED CONFIRMATION SOIL BOREHOLE LOCATIONS

OU6-Ordnance Testing Laboratory
IRP Site ST35
Oil Leak
Air Force Plant PJKS, Colorado

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Denver, Colorado

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Augers and other downhole equipment will be cleaned before use and between boreholes to prevent cross-contamination. Cleaning will be accomplished using a high-pressure hot-water wash, followed by a potable water rinse. Decontamination fluids will be collected and contained in labeled 55-gallon drums.

Boreholes will be drilled to 5 feet below the groundwater table or to the top of the competent (unweathered) bedrock, whichever is encountered first. The estimated borehole depth is 25 feet bgs, and the estimated maximum drilling footage for these seven boreholes is 175 feet. Boreholes will be logged by a Parsons ES geologist. Soil types will be classified according to the Unified Soil Classification System (USCS) and described in accordance with the standard Parsons ES soil description format. Soil samples will be collected at 5-foot intervals from the base of the former UST excavation, assumed to be at a depth of 6 feet bgs, to 5 feet below the groundwater table (i.e., sample collection at 5 to 7 feet bgs, 10 to 12 feet bgs, 15 to 17 feet bgs, etc.) or until competent bedrock is encountered, whichever occurs first. All soil samples will be visually examined and field analyzed using a PID and a TVHA. Based on field observations, the two samples with the greatest apparent contamination from each boring will be selected and submitted for laboratory analysis of TEPH and BTEX.

Soil samples will be collected in a standard split-barrel sampler that will be lowered through the hollow stem of the augers and driven approximately 1.5 foot (or to refusal, if shallower) into undisturbed soil, ahead of the augers. Between sampling events, the split-barrel sampler will be cleaned with Alconox® detergent, followed by successive potable and distilled water rinses.

The split-barrel sampler will be fitted with three precleaned, 6-inch-long, thin-walled, brass sleeves. Before samples are collected, sample sleeves will be cleaned using the same procedure as that described for the sampler. After collection of a sample, the sampler will be retrieved, split apart, and the sleeves will be removed. In preparation for laboratory submittal, the ends of the lowest (i.e., deepest) brass sleeve will be covered with Teflon® sheets and plastic end caps.

The upper (i.e., shallower) sample sleeves will be used for geologic logging and will be screened in the field for organic vapors using a PID and a TVHA. The data obtained from the logging and screening will be recorded on the borehole logs. Based upon field determination, two sleeves per boring will be selected for laboratory analysis, and labeled with the site name and borehole number, sample depth, date of collection, project name, and other pertinent data. These sleeves will be sealed in plastic bags and immediately placed in an insulated cooler containing ice. The soil samples will be maintained in a chilled condition until delivered to the analytical laboratory. Chain-of-custody records will be prepared in the field and will accompany the samples to the analytical laboratory.

Boreholes will be abandoned using cement/bentonite grout following drilling and sampling. The grout mixture will contain a maximum of 5 percent bentonite.

4.2 SOIL SAMPLE ANALYSIS

Proposed soil sample analytical methods and detection limits are presented in Table 4.1. All samples will be analyzed by a State of Colorado-certified and AFCEE-approved laboratory. Parsons ES proposes to analyze samples from the OTL former UST site for TEPH by USEPA Method SW8015, modified for diesel-range organics, and by USEPA Method SW8240B for BTEX and chlorinated VOCs. Quality control (QC) samples also will be collected and analyzed to assess field and laboratory methods. QC samples to be analyzed include a minimum of one trip blank, one matrix spike/matrix spike duplicate, and one rinseate blank.

TABLE 4.1
PROPOSED SOIL SAMPLE ANALYTICAL METHODS, PRACTICAL QUANTITATION LIMITS, AND NUMBER OF SAMPLES
OU6 - ORDNANCE TESTING LABORATORY, IRP SITE ST35, OIL LEAK
AIR FORCE PLANT PJKS, COLORADO

Analyte	Number of Samples [a]	PQL (mg/kg) [b]
USEPA Method SW8015		
Modified for Diesel-Range Organics [c]	14	10.0
USEPA Method SW8240B		
Acetone	14	0.1
Benzene	14	0.005
Bromodichloromethane	14	0.005
Bromoform	14	0.005
Bromomethane	14	0.01
2-Butanone	14	0.05
Carbon disulfide	14	0.005
Carbon tetrachloride	14	0.005
Chlorobenzene	14	0.005
Chlorodibromomethane	14	0.005
Chloroethane	14	0.01
2-Chloroethyl vinyl ether	14	0.01
Chloroform	14	0.005
Chloromethane	14	0.01
1,1-Dichloroethane	14	0.005
1,2-Dichloroethane	14	0.005
1,1-Dichloroethene	14	0.005
cis-1,2-Dichloroethene	14	0.005
trans-1,2-Dichloroethene	14	0.005
1,2-Dichloropropane	14	0.005
cis-1,3-Dichloropropene	14	0.005
trans-1,3-Dichloropropene	14	0.005
Ethylbenzene	14	0.005
2-Hexanone	14	0.05
Methylene chloride	14	0.005
4-methyl-2-Pentanone	14	0.05
Styrene	14	0.005
1,1,2,2,-Tetrachloroethane	14	0.005
Tetrachlorethene	14	0.005
Toluene	14	0.005
1,1,1-Trichloroethane	14	0.005
1,1,2-Trichloroethane	14	0.005
Trichloroethene	14	0.005
Vinyl acetate	14	0.05
Vinyl chloride	14	0.002
m,p-Xylene	14	0.005
o-Xylene	14	0.005

[a] Excludes QC samples. If optional boreholes are required, two additional samples per optional borehole also will be collected and analyzed.

[b] PQL = Inchcape Testing Services Laboratory, Richardson, Texas, practical quantitation limit;
mg/kg = milligrams per kilogram.

[c] Results will be reported for the C11-C28 range (diesel) of carbon chains using the simulated distillation method.

SECTION 5

SITE CONFIRMATION SAMPLING REPORT FORMAT

Following receipt of the laboratory analytical results, a draft confirmation soil sampling report will be prepared and submitted to Headquarters ASC/EMR and AFCEE.

The report will contain the following information for the former UST site:

- Plot plans showing final borehole locations;
- Summary of field activities;
- Assessment of analytical results in comparison to CDOLE (1995) RAC II soil cleanup criteria for TPH and BTEX;
- Laboratory analytical reports and chain-of-custody forms;
- Borehole logs; and
- Conclusions and recommendations for site closure or additional cleanup action.

Comments received from ASC/EMR and AFCEE will be incorporated into a draft final report to be distributed to AFCEE, ASC/EMR, EPA, CDPHE, and CDOLE.

SECTION 6

WASTE MANAGEMENT PLAN

This waste management plan applies to the activities that will be performed for confirmation soil sampling at AFP PJKS. The plan describes the types of investigation derived waste (IDW) that will be generated and management of the generated waste, including inventory, tracking, reporting, and disposal.

6.1 WASTE TYPES

The waste materials that may be generated during the confirmation sampling and managed under this plan include both solid materials and waste waters. The solid materials include cuttings produced from drilling soil boreholes, disposable sampling equipment, and personal protective equipment (PPE). The waste waters that may be produced include rinseate water from decontamination of drilling and sampling equipment. The following paragraphs describe the management procedure for these materials.

6.2 WASTE MANAGEMENT

6.2.1 Drill Cuttings

Soil drill cuttings, as an environmental media, are not considered as solid waste. They can, however, contain listed hazardous wastes or enough hazardous constituents that they may exhibit hazardous waste characteristics. The general approach is to manage soil cuttings in a conservative manner by containerizing them, unless there is information available to predetermine that the soil is clean. The following paragraphs describe the management of drill cuttings from soil boreholes.

The soil borehole sampling locations were selected to confirm adequate remediation of soils previously identified as being contaminated with fuel related hydrocarbons. As such, drill cuttings from site boreholes will be containerized into 55-gallon drums (DOT 17-H) as the standard procedure. Soil borehole drilling is designed to terminate 5 feet below the groundwater table or at the top of competent bedrock, whichever occurs first. The typical borehole total depth is expected to be approximately 25 feet bgs. Soil cuttings will be field screened while drilling using a PID. Samples for laboratory analysis will be selected based on field screening results. Containerized soil cuttings from boreholes will be left at the drill site until the laboratory analytical data is available. If the soil does not contain any hazardous constituents at concentrations exceeding risk-based soil criteria for AFP PJKS, then the soil cuttings will be spread on

the ground surface near the boreholes. AFP PJKS risk-based soil criteria for human and ecological receptors are summarized on Table 6.1.

If the analytical results indicate contaminant levels exceed the risk-based soil criteria, the containerized drill cuttings will be properly labeled, transported to a waste storage area, and managed appropriately. If the risk-based soil criteria are exceeded, it is expected that containerized soil from the site will be classified as Petroleum Contaminated Soil as defined in *State of Colorado Department of Public Health and Environment, Information Regarding the Management of Petroleum Contaminated Soil* (CDPHE, 1995). Any containerized soil exceeding the risk-based criteria and classified as petroleum contaminated soil will be disposed of at a landfill licensed to accept these wastes. Based on analytical results, drill cuttings which either contain a listed hazardous waste or sufficient hazardous constituents that they exhibit hazardous waste characteristics will be disposed of at a licensed treatment, storage, disposal, and recycling (TSDR) facility.

6.2.2 Personal Protective and Disposable Sampling Equipment

Confirmation soil sampling equipment and clothing which becomes contaminated, and will not be reused, will be containerized for offsite disposal. Examples of PPE include latex gloves and Tyvek® suits. Sample bottles and plastic sheeting are examples of disposable sampling equipment. These materials represent solid waste and will be considered hazardous waste if they are suspected to be contaminated with listed wastes. These materials will be containerized and managed in accordance with State of Colorado policies for IDW (CDPHE).

6.2.3 Decontamination/Equipment Rinseate Water

Rinseate water generated at the drill site will be collected and transported to a centralized decontamination facility at AFP PJKS where drill rigs and large equipment are decontaminated. Large equipment will be decontaminated at the centralized facility on asphalt pads which are enclosed by berms. Water generated during decontamination drains from the asphalt pads into a concrete sump. After each decontamination event, the rinseate water will be pumped from the sump into temporary storage tanks, also situated on a pad which drains into the sump. When a storage tank becomes full, a sample is collected from the tank and taken to the Lockheed Martin (LM) laboratory for treatability analysis. If the water can be treated at the LM water treatment facility, LM will dispatch a vacuum truck to pump out the temporary tank contents and transport the waste water directly to batch tanks at the LM water treatment facility. If the water cannot be treated at the LM facility, the waste water will be managed in accordance with State of Colorado hazardous waste regulations. This rinseate water will enter the wastewater treatment system within 90 days of removal from the sump.

6.3 WASTE INVENTORY, TRACKING, AND REPORTING

All solid materials generated from confirmation soil sampling activities and classified as containing hazardous or petroleum contaminated waste, will be managed using "cradle-to-grave" tracking procedures. Formal documentation of the waste stream will commence when a container is placed into service. A container is placed into service

TABLE 6.1
SOIL CRITERIA FOR HUMAN AND ECOLOGICAL RECEPTORS
OU6 - ORDNANCE TESTING LABORATORY, IRP SITE ST35, OIL LEAK
AIR FORCE PLANT PJKS, COLORADO

Analyte	Human Receptors Carcinogenic [a] (mg/kg)	Human Receptors Non-Carcinogenic [b] (mg/kg)	Ecological Receptors [c] (mg/kg)
USEPA Method SW8240B			
Acetone	—	27,000	—
Benzene	22.07	—	525-20,000
Bromodichloromethane	4.92	5,400	—
Bromoform	81.01	5,400	—
Bromomethane	—	378	—
2-Butanone	—	13,500	—
Carbon disulfide	—	27,000	—
Carbon tetrachloride	4.92	189	—
Chlorobenzene	—	5,400	—
Chlorodibromomethane	7.62	5,400	—
Chloroethane	0.34	—	—
2-Chloroethyl vinyl ether	—	—	—
Chloroform	104.92	2,700	—
Chloromethane	49.23	—	—
1,1-Dichloroethane	—	27,000	—
1,2-Dichloroethane	7.03	—	—
1,1-Dichloroethene	1.07	2,430	—
cis-1,2-Dichloroethene	—	2,700	—
trans-1,2-Dichloroethene	—	5,400	—
1,2-Dichloropropane	—	—	—
cis-1,3-Dichloropropene	3.56	81	—
trans-1,3-Dichloropropene	3.56	81	—
Ethylbenzene	—	27,000	190,000
2-Hexanone	—	—	—
Methylene chloride	85.33	16,200	—
4-methyl-2-Pentanone	—	—	—
Styrene	—	54,000	—
1,1,2,2,-Tetrachloroethane	3.20	—	—
Tetrachlorethene	—	2,700	—
Toluene	—	54,000	—
1,1,1-Trichloroethane	—	24,300	—
1,1,2-Trichloroethane	11.23	1,080	—
Trichloroethene	—	—	—
Vinyl acetate	—	—	—
Vinyl chloride	0.34	—	>200
m,p-Xylene	—	540,000	—
o-Xylene	—	540,000	—

Source: Parsons ES, 1993b

[a] Preliminary Remediation Goals (PRGs) for residential ingestion of soils calculated from carcinogenic slope factors.

[b] PRGs for residential ingestion of soils calculated from noncarcinogenic reference doses.

[c] Literature phytotoxicity guidelines for soil.

when it is assigned an accumulation start date, a unique identification number, and a waste tracking inventory sheet. The waste tracking inventory sheet is initiated when a container is placed into service. Entries are made on the waste tracking inventory sheet in the information section as waste is added to the container, or if the container is moved to a new location. This information allows the identification of all containers in service and the number of days left on each container's 90-day clock. The inventory sheet is completed and the unique identification number is closed when the waste is treated, consolidated, or shipped to a commercial TSDR, or other licensed waste disposal facility, depending on the waste classification.

Establishment of a waste stream profile sheet requires preparation of a commercial TSDR facility, or other licensed waste disposal facility, profile information sheet. The characterization information that must be entered on the form is required by the disposal facility to profile and except the waste. When a shipment is made, a Uniform Hazardous Waste Manifest or appropriate State manifest is prepared and accompanies each shipment to the disposal facility. This record includes the generator copy of the manifest which is replaced by the original copy upon return, including the commercial disposal facility representative's signature. Manifest information is added to the waste tracking inventory sheet.

Containers holding waste water that are taken to the 90-day accumulation area are inspected weekly to ensure that they enter the waste water treatment plan system within 90 days. Wastewater that cannot be treated at the LM facility will be inventoried, profiled, and manifested according to the same procedures outlined above.

SECTION 7

PLANT SUPPORT REQUIREMENTS

The following AFP PJKS support is needed prior to the arrival of the drillers and the Parsons ES team:

- Assistance in obtaining drilling and digging permits.
- Arrangement of site and plant access for Parsons ES and the drilling subcontractor.
- Provision of an acceptable area for equipment decontamination.
- Provision of a potable water supply for decontamination activities.
- Assistance in handling/treating decontamination rinseate water.

SECTION 8

PROJECT SCHEDULE

The following schedule is contingent upon approval of this confirmation sampling and analysis plan and completion of AFP PJKS support requirements.

Event	Date
Submit Draft Confirmation SAP to AFCEE and ASC/EMR	28 June 1996
Receipt of AFCEE and ASC/EMR Comments	26 July 1996
Submit Draft Final SAP to AFCEE and ASC/EMR	20 September 1996
Begin Confirmation Soil Sampling	21 October 1996
Submit Draft Confirmation Soil Sampling Report to AFCEE and ASC/EMR	20 December 1996
Receipt of AFCEE and ASC/EMR Comments	10 January 1997
Submit Draft Final Confirmation Soil Sampling Report to AFCEE, ASC/EMR, EPA, CDPHE, and CDOLE	24 January 1997

SECTION 9

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SECTION 10

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APPENDIX B
BORING LOGS

GEOLOGIC BORING LOG

BORING NO. OTL-1 · CONTRACTOR: Site Services · DATE SPUD: 12/3/96 1010
CLIENT: PJHS / AECEE · RIG TYPE: CME-75 · DATE CMPL: 12/3/96 1100
JOB NO.: 726876.30122 · DRLG METHOD: HSA · ELEVATION: ~ 6060' msl
LOCATION: OTL-Site ST35 · BORING DIA.: OD 8" ID 4.25 · TEMP.: 45°F
GEOLOGIST: C Snyder · DRLG FLUID No · WEATHER: Sunny winds - 10 MPH
COMMENTS:

Elev. (ft.)	Depth (ft.)	Pro-file	US CS	Geologic Description	Samples No.	Samples Depth (ft)	Sample Type	Penet. Res.	Remarks TIP = Bkgrnd/Reading (ppm)
	1			0-6" Concrete					
	5		ML	SILT, clayey Brown - slt Moist reddish		5-6.5		3,5,6	Headspace PID = 0.5 ppm
	6			brn sand m. grn, course grn whitish					BG = 0.5 ppm
				no odor					
	10		ML	SILT, dark brown some sand red coarse		10-11.5		4,7,5	Headspace PID = 0.7ppm
				grn slightly moist - no odor					BG = 0.5 ppm
	15		ML	SAA - sl moist - no odor		15-16.5		4,5,5	Headspace PID = 0.7 ppm
									BG = 0.5 ppm
	20		CL-ML	Clayey - silt brn - moist		20-21.5		4,6,7	Headspace PID = 4.2 ppm / BG = 0.5 ppm
				some ~~gravel~~ pebbles/cobbles - no odor					Lab Sample - 10:30
	25		ML	sandy silt - red brown sm ~~slt~~ white f		25-26.5			Headspace PID = 1.1 ppm / BG = 0.5 ppm
				weathered sand - no odor				10,22,26	Lab Sample 10:40
				Air sample					stop drilling at
				BG / BZ 0.5 / 0.5 ppm					26.5' hit Bedrock
	30								

sl – slight · v – very · f – fine
tr – trace · lt – light · m – medium
sm – some · dk – dark · c – coarse
& – and · bf – buff · BH – Bore Hole
@ – at · brn – brown · SAA – Same As Above
w – with · blk – black

SAMPLE TYPE
D – DRIVE · C Core recovery
C – CORE
G – GRAB · Core lost

Water level drilled

GEOLOGIC BORING LOG

BORING NO. OTL-2 | CONTRACTOR: Site Services | DATE SPUD: 12/3/96 11:20
CLIENT: FJKS / AFCEE | RIG TYPE: CME-75 | DATE CMPL: 12/3/96 1200
JOB NO.: 726876.30122 | DRLG METHOD: HSA | ELEVATION: ~ 6060' msl
LOCATION: OTL ST 35 | BORING DIA.: 8" OD 4.25" ID | TEMP.: 45°F
GEOLOGIST: C. Snyder | DRLG FLUID: NO | WEATHER: Sunny Wind-gust 10-15 mph
COMMENTS:

Elev. (ft.)	Depth (ft.)	Profile	US CS	Geologic Description	Samples No.	Samples Depth (ft)	Sample Type	Penet. Res.	Remarks TIP = Bkgrnd/Reading (ppm)
	1			0-6" Asphalt					
	5		ML	Clayey silt brown moist, sm coarse sand red/brown sm pebbles gravel up to 0.5" - No odor		5-6.5		2,5,18	PID = 0.7 ppm BG = 0.5 ppm
	10		SP	Coarse - M. sand - native color - red/brn dk brown staining - tr pebbles ~~sm gravel~~ cbb Faint odor - moist		10-11.5		6,7,6	PID = 0.9 ppm / BG = 0.5 ppm Lab Sample 1130
	15		ML	SILT w/ sm clay med-brn no staining - no odor		15-16.5		1,2,3	PID = 0.8 ppm / BG = 0.5 ppm
	20		SP	tr. pebbles F grn sand w/ sl ~~cement small gravel~~ cbb red/brown - no staining - no odor - sl moist		20-21.5		3,4,3	PID = 0.9 ppm / BG = 0.5 ppm
	25		ML	SILT w/ sm clay dkr brn color sl staining, sm hydrocarbon odor sl moist 27.5' White Sandstone bedrock		25-26.5		6,6,8	PID = 55.2 ppm / BG = 0.5 pp Lab Sample 1150 Bedrock at 27.5' bgs Refusal at 3" & 50 blows
	30								

sl – slight | v – very | f – fine
tr – trace | lt – light | m – medium
sm – some | dk – dark | c – coarse
& – and | bf – buff | BH – Bore Hole
@ – at | brn – brown | SAA – Same As Above
w – with | blk – black

SAMPLE TYPE
D – DRIVE C – Core recovery
C – CORE
G – GRAB Core lost

Water level drilled

Air sample BG/BZ 0.5/0.5 ppm

ENGINEERING-SCIENCE

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GEOLOGIC BORING LOG

BORING NO. OTL-3 | CONTRACTOR: Site Services | DATE SPUD: 12/3/96 1220
CLIENT: AFCEE / JHG | RIG TYPE: CME-75 | DATE CMPL: 12/3/96 1250
JOB NO.: 726876.30122 | DRLG METHOD: HSA | ELEVATION: ~6060' msl
LOCATION: SITE ST35 (OTL) | BORING DIA.: OD 8", ID 4.25" | TEMP.: 45°F
GEOLOGIST: C. Snyder | DRLG FLUID: NO | WEATHER: Sunny winds 10-15
COMMENTS:

Elev. (ft.)	Depth (ft.)	Pro-file	US CS	Geologic Description	Samples No.	Samples Depth (ft)	Sample Type	Penet. Res.	Remarks TIP = Bkgrnd/Reading (ppm)
	1			0-6" Asphalt					
	5		CL-ML	SILTY CLAY - brn - moist w/ ~~sm~~ CBR pebbles ~~gravel~~ CBR no oder		5-6.5		0,1,2	Headspace PID = 1.1 ppm BG = 0.6 ppm
	10		SP	Brown F grn sand w/ ~~tr~~ pebbles ~~gravel~~ - moist slight dk staining - slight HC oder		10-11.5		2,5,6	Headspace PID = 1.1 ppm BG = 0.6 ppm
	15		ML	Clayey silt sl moist med to dk brn slight HC oder sl staining		15-16.5		3,7,8	Headspace PID = 12.5 ppm/BG = 0.6 ppm Lab Sample at 1245 Lab Sample at 1250
	20		SP	C grn sand, tr pebbles ~~gravel~~ reddish/brn little staining, M HC oder		20-21.5		50@6"	PID = 135 ppm/BG = 0.6 ppm Headspace 30% Recovery TD = 20' Bedrock ~ 20' bgs
	25								
	30								

sl – slight | v – very | f – fine
tr – trace | lt – light | m – medium
sm – some | dk – dark | c – coarse
& – and | bf – buff | BH – Bore Hole
@ – at | brn – brown | SAA – Same As Above
w – with | blk – black

SAMPLE TYPE
D – DRIVE C Core recovery
C – CORE
G – GRAB Core lost

Water level drilled

Sheet of

GEOLOGIC BORING LOG

BORING NO. OTL-4 CONTRACTOR: Site Services DATE SPUD: 12/3/96 1440
CLIENT: AFCEE/PJHS RIG TYPE: CME-75 DATE CMPL: 12/3/96 1510
JOB NO.: 726876.30122 DRLG METHOD: HSA ELEVATION: ~6090' amsl
LOCATION: OTL SITE ST36 BORING DIA.: OD 8" ID 4.25" TEMP.: 45°F
GEOLOGIST: C. Snyder DRLG FLUID No WEATHER: Sunny winds ~15mph
COMMENTS:

Elev. (ft.)	Depth (ft.)	Pro-file	US CS	Geologic Description	Samples No.	Samples Depth (ft)	Sample Type	Penet. Res.	Remarks TIP = Bkgrnd/Reading (ppm)
	1			0-6" Asphalt					
	5		ML	SILT w/ tr ~~gravel~~ pebbles brn, moist		5-6.5		5/6/6	Headspace PID = 3.0 ppm
				Bd staining - no oder					BG = 1.1 ppm
	10		ML	SAA w/ dkr staining - sl moist					HEADSPACE
				- no oder		10-11.5		2,4,4	PID = 3.6 ppm/BG = 1.1 ppm
	15		CL-ML	~~Clayey~~ silty clay lighter brn					Headspace
				than at 10-11.5' bgs, sl moist		15-16.5		2,4,4	PID = 8.9 ppm/BG = 1.1 ppm
				- no oder, minimal staining					Lab Sample 1500
	20		ML	silt w/ sm clay reddish/brn		20-21.5		6,13,16	Headspace PID = 67.4 ppm/BG = 1.1 ppm
				~~Sm gravel~~ tr pebbles sl moist - no staining,					Lab Sample 1510
				m. hydrocarbon oder					
	25			No Recovery - Unknown		25-26.5		50@1"	Hit bedrock at 24.5' bgs
									No Recovery
	30								

sl – slight v – very f – fine
tr – trace lt – light m – medium
sm – some dk – dark c – coarse
& – and bf – buff BH – Bore Hole
@ – at brn – brown SAA – Same As Above
w – with blk – black

SAMPLE TYPE
D – DRIVE C – Core recovery
C – CORE
G – GRAB Core lost

Water level drilled

Sheet 1 of 1

GEOLOGIC BORING LOG

BORING NO. OTL-5 | CONTRACTOR: SITE Services | DATE SPUD: 12/4/96 0740
CLIENT: AFCEE/IRP6 | RIG TYPE: CME-75 | DATE CMPL: 12/4/96 0810
JOB NO.: 726576.30122 | DRLG METHOD: HSA | ELEVATION: ~6060' msl
LOCATION: SITE ST 35 (OTL) | BORING DIA.: 9" OD 4.25" ID | TEMP.: ~30°F
GEOLOGIST: C. Snyder | DRLG FLUID: NO | WEATHER: W 10kt ~10 20's sunny
COMMENTS:

Elev. (ft.)	Depth (ft.)	Profile	US CS	Geologic Description	Samples No.	Samples Depth (ft)	Sample Type	Penet. Res.	Remarks TIP = Bkgrnd/Reading (ppm)
	1			0-6" Concrete					
	5		ML	Silt w/sm clay & F sand, md brn w/ sm red streaks, sl moist no odor		5-6.5		3,5,8	Headspace PID = 6.4 ppm BG = 1.0 ppm
	10		ML	SAA w/ dkr brn staining tr pebbles		10 11.5		3,5,8	Headspace PID = 6.7 / BG = 1.0 ppm &
	15		ML	Silt w/ sm sand - F, md brn no staining, no odor - tr. pebbles		15-16.5		4,7,9	Headspace PID = 6.9 ppm / BG = 1.0 ppm Lab Sample 0800 MS/MSD
	20		SP	m. grn sand, tr silt weathered white rock rndy w/ brn red - dry - ~~sat~~ sm hc odor		20-21.5		28, 50/3"	Headspace PID = 111 ppm / BG = 1.0 ppm 30% Recovery Bedrock ~ 20' Lab Sample 0810
	25								
	30								

sl – slight | v – very | f – fine
tr – trace | lt – light | m – medium
sm – some | dk – dark | c – coarse
& – and | bf – buff | BH – Bore Hole
@ – at | brn – brown | SAA – Same As Above
w – with | blk – black

SAMPLE TYPE
D – DRIVE C – Core recovery
C – CORE
G – GRAB Core lost

Water level drilled

Sheet of

GEOLOGIC BORING LOG

BORING NO. OTL-6 CONTRACTOR: Site Services DATE SPUD: 12/4/96 0830
CLIENT: AFCEE/JPTHS RIG TYPE: CME-75 DATE CMPL: 12/4/96 0905
JOB NO.: 721576.30122 DRLG METHOD: HSA ELEVATION: ~6060' msl
LOCATION: SITE SS-35 (OTL) BORING DIA.: 8" OD 4.25" ID TEMP.: ~30° F
GEOLOGIST: C. Snyder DRLG FLUID No WEATHER: Sunny, Windy ~ 20 mph
COMMENTS:

Elev. (ft.)	Depth (ft.)	Pro-file	US CS	Geologic Description	Samples No.	Samples Depth (ft)	Sample Type	Penet. Res.	Remarks TIP = Bkgrnd/Reading (ppm)
	1			0-6" Asphalt					
	5		ML	silt w/ tr pebbles/cobbles & fine sand, med brn, sl moist no odor or staining		5-6.5		2,4,5	Headspace PID = 3.1 ppm BG = 0.8 ppm Lab Sample 0835
	10		ML	silt w/ sm f sand & pebbles/cobbles, red/brn w/ gray/dk brn staining sl. moist, no odor		10-11.5		5,6,4	Headspace PID = 1.8 ppm / BG = 0.8 ppm
	15		ML	SAA w/ minimal staining		15-16.5		4,6,6	Headspace PID = 1.5 ppm / BG = 0.8 ppm
	20		SP	mxd gran sand, tr pebbles red/gray w/ sm white, dry, HC odor				50 @ 6"	Headspace PID = 39.6 ppm / BG = 0.8 ppm 30% Recovery Lab Sample 0900 Bedrock ~ 21' bgs
	25								
	30								

sl – slight
tr – trace
sm – some
& – and
@ – at
w – with

v – very
lt – light
dk – dark
bf – buff
brn – brown
blk – black

f – fine
m – medium
c – coarse
BH – Bore Hole
SAA – Same As Above

SAMPLE TYPE
D – DRIVE
C – CORE
G – GRAB

C Core recovery
Core lost
Water level drilled

GEOLOGIC BORING LOG

BORING NO. OTL-7 CONTRACTOR: Site Services DATE SPUD: 12/3/96 1530
CLIENT: AFCEE/PJHS RIG TYPE: CME-75 DATE CMPL: 12/3/96 1605
JOB NO.: 726876.30122 DRLG METHOD: HSA ELEVATION: ~6060' msl
LOCATION: A SITE ST35 (OTL) BORING DIA.: 8" OD 4.25" ID TEMP.: ~45° F
GEOLOGIST: C. Snyder DRLG FLUID No WEATHER: Sunny, Winds ~ 15 mph
COMMENTS:

Elev. (ft.)	Depth (ft.)	Pro-file	US CS	Geologic Description	Samples No.	Samples Depth (ft)	Sample Type	Penet. Res.	Remarks TIP = Bkgrnd/Reading (ppm)
	1			0-6" asphalt					
									Headspace
	5		ML	Clayey silt w/ tr. ~~pebbles~~ CBR med brn - moist - no odor or staining		5-6.5		2,4,7	PID = 2.6 ppm BL = 1.1 ppm
	10		ML	SAA w/ sl dkr brn staining & red streaks no odor		10-11.5		2,4,8	Headspace PID = 3.2/186=1.1 ppm Lab Sample 1545
	15		ML	SILT m. brn w/ sm staining @ 10' bgs - sl moist - no odor		15-16.5		3,9,10	Headspace PID = 1.6 ppm 186=1.1 ppm
	20		SP	C. grn sand, tr. gravel/granule orangish/brown - ~~sl moist~~ dry no odor		20-21		13 50/3"	Headspace PID = 1.6 ppm 186=1.1 ppm Drilling w/ more difficulty at 20' bgs Lab Sample 1600 Bedrock ~ 21' bgs
	25		SP	5% Recovery Sandstone C. grn white - no odor		25-25.25		50@2"	
	30								

sl – slight v – very f – fine
tr – trace lt – light m – medium
sm – some dk – dark c – coarse
& – and bf – buff BH – Bore Hole
@ – at brn – brown SAA – Same As Above
w – with blk – black

SAMPLE TYPE
D – DRIVE C – Core recovery
C – CORE
G – GRAB Core lost

Water level drilled

Sheet 1 of 1

GEOLOGIC BORING LOG

BORING NO. OTL-SS-1 CONTRACTOR: Site Services DATE SPUD: 12/4/96 0920
CLIENT: AFCEE / ISKS RIG TYPE: CME-75 DATE CMPL: 12/4/96 0945
JOB NO.: 726876 DRLG METHOD: HSA ELEVATION: ~6060' msl
LOCATION: SITE ST 35 BORING DIA.: 8" OD 4.25" ID TEMP.: ~30°F
GEOLOGIST: C. Snyder DRLG FLUID No WEATHER: Sunny, windy ~20mph
COMMENTS:

Elev. (ft.)	Depth (ft.)	Pro-file	US CS	Geologic Description	Samples No.	Samples Depth (ft)	Sample Type	Penet. Res.	Remarks TIP = Bkgrnd/Reading (ppm)
	1			0-6" asphalt					
									Headspace
	5		ML	SILT w/sm sand, tr pebbles		5-6.5		2,4,5	PID = 2.9 ppm
				med. brn, moist no odor					BG = 1.1 ppm
									Lab Sample 0925
									Headspace
	10		ML	SAA w/ dk brn staining &		10-11.5		2,6,10	PID = 2.9 ppm/BG = 1.1 ppm
				sl moist - no odor					Lab Sample 0930
									Dup Labeled OTL-SS-10
									Headspace
	15		ML	SILT w/sm clay, med.brn no		15-16.5		6,9,11	PID = 1.4 ppm/1.1 ppm
				staining, no odor sl moist					
	20		SP	Mixed grn sand ~~red~~ white layered		20-21.5		23, 50 for 3"	PID = 1.1 ppm/BG = 1.1 ppm
				in red - white sandstone, dry					35% Recovery
				no odor or staining					Bedrock ~21' bgs
	25								
	30								

sl – slight v – very f – fine
tr – trace lt – light m – medium
sm – some dk – dark c – coarse
& – and bf – buff BH – Bore Hole
@ – at brn – brown SAA – Same As Above
w – with blk – black

SAMPLE TYPE
D – DRIVE C Core recovery
C – CORE
G – GRAB Core lost

Water level drilled

APPENDIX C
LABORATORY ANALYTICAL RESULTS

Inchcape Testing Services
Environmental Laboratories

1089 E. Collins Blvd.
Richardson, TX 75081
Tel. 972-238-5591
Fax 972-238-5592

CUSTOMER: PARSONS ENGINEERING SCIENCE, Inc.

REPORT NUMBER: D96-13833
SAMPLES RECEIVED: 5-December-1996

Inchcape Testing Services
Environmental Laboratories

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CASE NARRATIVE

Inchcape Testing Services
Environmental Laboratories

1089 E. Collins Blvd.
Richardson, TX 75081
Tel. 972-238-5591
Fax 972-238-5592

DATE RECEIVED: 5-DEC-1996

REPORT NUMBER: D96-13833
REPORT DATE: 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc.
ADDRESS : 1700 Broadway, Suite 900
Denver, CO 80290
ATTENTION : Mr. Craig Snyder

PROJECT: 726876 AFP PJKS Site ST35

DATE SAMPLED : 3-December-1996

CASE NARRATIVE SUMMARY

This is an ITS QC Level 3 report. Please find enclosed results for the analysis of volatile organics and semivolatile organics by EPA methodologies.

EPA Method 8260 Volatile Organics Analysis

Calibrations

For the continuing calibration, the following compound was outside of the QC limits of <20%:

ITS1 11/26/96 08:09	chloromethane (24.9%)
ITS1 12/06/96 15:51	carbon disulfide (25.6%)
ITS1 12/09/96 08:30	chloromethane (28.2%) carbon disulfide (55.2%)
ITS7 12/02/96 08:52	chloroethane (28.7%) carbon tetrachloride (209%)

Since all calibration check compounds were within QC limits, the calibration was accepted.

EPA Method 8015M Diesel Range Organics Analysis

Matrix Spike Analysis

For the matrix spike analysis of soil sample D96-14033-2, the recoveries for total petroleum hydrocarbons were outside of the QC limits of 30.0-150%, because the concentration of this analyte in the unspiked sample was greater than the spiking level of 83.3 mg/Kg. Since the blank spike analyses were within QC limits, the results were accepted.

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JOB ID : D96-13833
CUSTOMER : Parsons Engineering Science, Inc
PROJECT : 726876 AFP PJKS Site ST35

SAMPLE ID : D96-13833-1 DATE SAMPLED : 3-DEC-1996
ID MARKS : OTL-1 N1#(20-20')

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
8240_IRP_S /1	RLR	6-DEC-1996	RLR	6-DEC-1996	1206824001
8240_TIC /1			RLR	6-DEC-1996	1206824001
RBN_TEHS /1	MCP	5-DEC-1996	VHL	6-DEC-1996	1205801501
SOLID_TPER /1			SAB	12-DEC-1996	1212221609

SAMPLE ID : D96-13833-2 DATE SAMPLED : 3-DEC-1996
ID MARKS : OTL-1 N1#(25-25')

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
8240_IRP_S /1	RLR	6-DEC-1996	RLR	6-DEC-1996	1206824001
8240_TIC /1			RLR	6-DEC-1996	1206824001
RBN_TEHS /1	MCP	5-DEC-1996	MTW	11-DEC-1996	1205801501
SOLID_TPER /1			SAB	12-DEC-1996	1212221609
TOC_S /1			KPP	8-JAN-1997	AB786048

SAMPLE ID : D96-13833-3 DATE SAMPLED : 3-DEC-1996
ID MARKS : OTL-2 N1#(10-10')

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
8240_IRP_S /1	RLR	6-DEC-1996	RLR	6-DEC-1996	1206824001
8240_TIC /1			RLR	6-DEC-1996	1206824001
RBN_TEHS /1	MCP	5-DEC-1996	VHL	6-DEC-1996	1205801501
SOLID_TPER /1			SAB	12-DEC-1996	1212221609

SAMPLE ID : D96-13833-4 DATE SAMPLED : 3-DEC-1996
ID MARKS : OTL-2 N1#(25-25')

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
8240_IRP_S /1	RLR	6-DEC-1996	RLR	6-DEC-1996	1206824001

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JOB ID : D96-13833
CUSTOMER : Parsons Engineering Science, Inc
PROJECT : 726876 AFP PJKS Site ST35

SAMPLE ID : D96-13833-8 DATE SAMPLED : 3-DEC-1996
ID MARKS : OTL-4 N1#(20-20')

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
8240_IRP_S /1	RLR	6-DEC-1996	RLR	6-DEC-1996	1206824001
8240_TIC /1			RLR	6-DEC-1996	1206824001
RBN_TEHS /1	MCP	5-DEC-1996	VHL	7-DEC-1996	1205801501
SOLID_TPER /1			SAB	12-DEC-1996	1212221609

SAMPLE ID : D96-13833-9 DATE SAMPLED : 3-DEC-1996
ID MARKS : OTL-7 N1#(10-10')

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
8240_IRP_S /1	RLR	6-DEC-1996	RLR	6-DEC-1996	1206824002
8240_TIC /1			RLR	6-DEC-1996	1206824002
RBN_TEHS /1	MCP	5-DEC-1996	VHL	7-DEC-1996	1205801501
SOLID_TPER /1			SAB	12-DEC-1996	1212221609

SAMPLE ID : D96-13833-10 DATE SAMPLED : 3-DEC-1996
ID MARKS : OTL-7 NN#(20-20')

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
8240_IRP_S /1	RLR	6-DEC-1996	RLR	6-DEC-1996	1206824002
8240_TIC /1			RLR	6-DEC-1996	1206824002
RBN_TEHS /1	MCP	5-DEC-1996	VHL	7-DEC-1996	1205801501
SOLID_TPER /1			SAB	12-DEC-1996	1212221609
TOC_S /1			KPP	8-JAN-1997	AB786048

SAMPLE ID : D96-13833-11 DATE SAMPLED : 4-DEC-1996
ID MARKS : OTL-5 N1#(15-15')

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
8240_IRP_S /1	RLR	6-DEC-1996	RLR	6-DEC-1996	1206824001

Inchcape Testing Services
Environmental Laboratories

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Richardson, TX 75081
Tel. 972-238-5591
Fax 972-238-5592

JOB ID : D96-13833
CUSTOMER : Parsons Engineering Science, Inc
PROJECT : 726876 AFP PJKS Site ST35

SAMPLE ID : D96-13833-15 DATE SAMPLED : 4-DEC-1996
ID MARKS : OTL-8 N1#(5-5')

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
8240_IRP_S /1	RLR	6-DEC-1996	RLR	6-DEC-1996	1206824002
8240_TIC /1			RLR	6-DEC-1996	1206824002
RBN_TEHS /1	MCP	5-DEC-1996	VHL	7-DEC-1996	1205801501
SOLID_TPER /1			SAB	12-DEC-1996	1212221610

SAMPLE ID : D96-13833-16 DATE SAMPLED : 4-DEC-1996
ID MARKS : OTL-8 N1#(10-10')

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
8240_IRP_S /1	RLR	6-DEC-1996	RLR	6-DEC-1996	1206824002
8240_TIC /1			RLR	6-DEC-1996	1206824002
RBN_TEHS /1	MCP	5-DEC-1996	VHL	7-DEC-1996	1205801501
SOLID_TPER /1			SAB	12-DEC-1996	1212221610

SAMPLE ID : D96-13833-17 DATE SAMPLED : 4-DEC-1996
ID MARKS : OTL-18 N1#(10-10')

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
8240_IRP_S /1	RLR	9-DEC-1996	RLR	9-DEC-1996	1209824001
8240_TIC /1			RLR	9-DEC-1996	1209824001
RBN_TEHS /1	MCP	5-DEC-1996	VHL	7-DEC-1996	1205801501
SOLID_TPER /1			SAB	12-DEC-1996	1212221610

SAMPLE ID : D96-13833-18 DATE SAMPLED : 4-DEC-1996
ID MARKS : FIELDQC# EB1#(0-0')

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
8240_IRP_L /1	MGD	5-DEC-1996	MGD	5-DEC-1996	1205824007

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Inchcape Testing Services
Environmental Laboratories

1089 E. Collins Blvd.
Richardson, TX 75081
Tel. 972-238-5591
Fax 972-238-5592

JOB ID : D96-13833
CUSTOMER : Parsons Engineering Science, Inc
PROJECT : 726876 AFP PJKS Site ST35

SAMPLE ID : D96-13833-23 DATE SAMPLED : 5-DEC-1996
ID MARKS : LABQC# LB1#(0-0')

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
8240_IRP_L /1	MGD	5-DEC-1996	MGD	5-DEC-1996	1205824007
8240_TIC /1			MGD	5-DEC-1996	1205824007
RBN_TEHL /1	JMR	5-DEC-1996	VHL	6-DEC-1996	1205801502

SAMPLE ID : D96-13833-24 DATE SAMPLED : 5-DEC-1996
ID MARKS : LABQC# BS1#(0-0')

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
8240_IRP_L /1	MGD	5-DEC-1996	MGD	5-DEC-1996	1205824007
RBN_TEHL /1	JMR	5-DEC-1996	VHL	6-DEC-1996	1205801502

SAMPLE ID : D96-13833-25 DATE SAMPLED : 4-DEC-1996
ID MARKS : FIELDQC# TB1#(0-0')

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
8240_IRP_L /1	MGD	5-DEC-1996	MGD	5-DEC-1996	1205824007
8240_TIC /1			MGD	5-DEC-1996	1205824007

SAMPLE ID : D96-13833-26 DATE SAMPLED : 18-DEC-1996
ID MARKS : LABQC# LB2#(0-0')

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
RBN_TEHS /1	CLT	10-DEC-1996	VHL	11-DEC-1996	AB949-31

SAMPLE ID : D96-13833-27 DATE SAMPLED : 18-DEC-1996
ID MARKS : LABQC# BS2#(0-0')

ANALYSIS	PRP	PRP DATE	ANL	ANL DATE	QC BATCH NUMBER
RBN_TEHS /1	CLT	10-DEC-1996	VHL	11-DEC-1996	AB949-31

Inchcape Testing Services
Environmental Laboratories

1089 E. Collins Blvd.
Richardson, TX 75081
Tel. 214-238-5591
Fax. 214-238-5592

CHAIN OF CUSTODY

[redacted]nchcape Testing Servi[redacted] En[redacted]ment [redacted]borat[redacted] 108[redacted] Colli[redacted]vd., #[redacted] Richar[redacted] TX 75[redacted] (972[redacted]5591 [redacted]HAIN[redacted] CU[redacted]DY [redacted]OR[redacted]

Report to:		Invoice to	
Company:	Parsons ES-	Company:	Same
Address:	1700 Broadway, Ste 900 Denver, CO 80290	Address:	
Contact:	Craig Snyder	Contact:	John Rutz
Phone:	303-831-8100	Phone:	Same
Fax:	303-831-8208	PO/SO #:	726876.30122

Sampler's Name: CRAIG SNYDER

Sampler's Signature: Craig B. Snyder

Proj. No.: 726876

Project Name: AFP PJKS SITE ST35

No./Type of Containers[2]: 1 each / Brass Liner

ANALYSIS REQUESTED: SW8015 Modified f/ Diesel Range Organics; SW 8240 B

Lab use only
Due Date: 12-13

Temp. of coolers when received (C°): C
1 | 2 | 3 | 4 | 5

Custody Seal N / Y
Intact N / Y

Screened For Radioactivity: [X]

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks of Sample(s)	VOA	A/G 1 Lt.	250 ml	P/O											Lab Sample ID (Lab Use Only)
S	12/3/96	1030		X	OTL-1-20'			1	X	X	X									13833-1
S	12/3/96	1040		X	OTL-1-25'			1	X	X	X									2
S	12/3/96	1130		X	OTL-2-10'			1	X	X	X									3
S	12/3/96	1150		X	OTL-2-25'			1	X	X	X									4
S	12/3/96	1245		X	OTL-3-15'			1	X	X	X									5
S	12/3/96	1250		X	OTL-3-20'			1	X	X	X									6
S	12/3/96	1500		X	OTL-4-15'			1	X	X	X									7
S	12/3/96	1510		X	OTL-4-20'			1	X	X	X									8
S	12/3/96	1545		X	OTL-7-10'			1	X	X	X									9
S	12/3/96	1600		X	OTL-7-20'			1	X	X	X									10

Turn around time: [X] Priority 1 or Standard [ ] Priority 2 or 50% [ ] Priority 3 or 100% [ ] Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

	Date:	Time:		Date:	Time:
Relinquished by: (Signature) Craig B. Snyder	12/4/96	1300	Received by: (Signature)	12/5/96	1000
Relinquished by: (Signature)			Received by: (Signature)		
Relinquished by: (Signature)			Received by: (Signature)		

Remarks: OPTION 2 Confirmation Sampling
Extended BIOVENTING
(Page 1 of 2)

Client's delivery of samples constitutes acceptance of Inchcape/ITS-Dallas terms and conditions contained in the Price Schedule.

[1] Matrix: WW - Wastewater; W - Water; S - Soil; SD - Solid; L - Liquid; A - Air Bag; C - Charcoal tube; SL - Sludge; O - Oil
[2] Container: VOA - 40 ml vial; A/G - Amber / Or Glass 1 Liter; 250 ml - Glass wide mouth; P/O - Plastic or other BRASS LINER

Inchcape cannot accept verbal changes. Please Fax written changes to 972-238-5592

OFFICE USE ONLY

ORIGINAL

3

[redacted]nc[redacted]pe [redacted]ting[redacted]rvi[redacted] E[redacted]men[redacted]bora[redacted] 108[redacted] Col[redacted]vd., #[redacted]ichar[redacted]TX,7[redacted] (972[redacted]5591[redacted]HAI[redacted] CU[redacted]DY [redacted]OR[redacted]

Report to:
Company: Parsons
Address:
Contact: Craig Snyder
Phone:
Fax:

Invoice to
Company:
Address:
Contact:
Phone:
PO/SO #:

Sampler's Name | Sampler's Signature

Proj. No. 726876 | Project Name: AFP PJKS Site ST35

ANALYSIS REQUESTED

Lab use only
Due Date: 12/7

Temp. of coolers when received (C°): 1 | 2 | 3 | 4 | 5

Custody Seal N / Y
Intact N / Y

Screened For Radioactivity ☐

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks of Sample(s)	No./Type of Containers[2] VOA	A/G 1 Lt.	250 ml	P/O	5W 8015 Diesel Range Organics 8240	Lab Sample ID (Lab Use Only)
GW					LB1					X X	13833-19
SQ					BS1					X X	20
SO	12/4	0800			MS1 OTL-5' 15'					X X	21
SO	↓	0800			SD1 OTL-5' 15'					X X	22
TW					LB1					X X	23
WQ					BS1					X X	24
					Added Trip Blank JDM					X	25

Turn around time ☐ Priority 1 or Standard ☐ Priority 2 or 50% ☐ Priority 3 or 100% ☐ Priority 4 ERS *

* BTEX (602/8020), TPH (418.1 or 8015), VOLATILES (624/8240), IGNITABILITY, TOTAL LEAD (6010)

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks

Client's delivery of samples constitutes acceptance of Inchcape/ITS-Dallas terms and conditions contained in the Price Schedule.

[1] Matrix: WW - Wastewater; W - Water; S - Soil; SD - Solid; L - Liquid; A - Air Bag; C - Charcoal tube; SL - Sludge; O - Oil
[2] Container: VOA - 40 ml vial; A/G - Amber / Or Glass 1 Liter; 250 ml - Glass wide mouth; P/O - Plastic or other _____

Inchcape cannot accept verbal changes. Please Fax written changes to 972-238-5592

OFFICE USE ONLY

14A

COOLER RECEIPT FORM

Date Received: 12/5/16 Project: 726876 AFP PJKS Site 5T35

Date Logged-in: 12/5/16 Received by: David Mey

No. of coolers received: 1 Cooler Numbers: N/A

1	Shipping slip. If yes, carrier and bill number: FED EX 324417550 6	(Yes)	No
2	Custody seals on cooler. If yes, how many and where: 1 on front	(Yes)	No
3	Custody seals intact.	(Yes)	No
4	Chain of Custody in plastic.	(Yes)	No
5	Chain of Custody filled out properly.	(Yes)	No
6	Client signed Chain of Custody.	(Yes)	No
7	Samples shipped on ice. If no, temperature of cooler:	(Yes)	No
8	All bottles sealed.	Yes	(No)
9	All bottles received intact.	(Yes)	No
10	Labels in good condition and complete.	(Yes)	No
11	Sample labels agree with Chain of Custody.	(Yes)	No
12	Correct containers used.	(Yes)	No
13	Correct preservative used.	(Yes)	No
14	Sufficient sample provided.	(Yes)	No
15	Bubbles absent from VOA.	(Yes)	No
16	Comments (use corrective action form if necessary):		

** If client or project manager need to be notify for any reason, please use the Case Narrative/Corrective Action green form.

Inchcape Testing Services
NDRC Laboratories

1089 E. Collins Blvd.
Richardson, TX 75081
Tel. 214-238-3591
Fax. 214-238-3592

ANALYTICAL RESULTS

Inchcape Testing Services
Environmental Laboratories

ANALYTICAL REPORT

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122

Included in this data package are the analytical results for the sample group which you have submitted to Inchcape Testing Services for analysis. These results are representative of the samples as received by the laboratory.

The information contained herein has undergone extensive review and is deemed accurate and complete. Sample analysis and quality control were performed in accordance with all applicable protocols. Please refrain from reproducing this report except in its entirety.

If you have any questions regarding this report and its associated materials please call your Project Manager at (214) 238-5591.

We appreciate the opportunity to serve you and look forward to providing continued service in the future.

Martin Jeffus
General Manager

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-1
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : OTL-1
: N1#(20-20')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 3-DEC-1996
PREPARATION METHOD : EPA 5030
PREPARED BY : RLR
PREPARED ON : 6-DEC-1996
ANALYSIS METHOD : EPA 8240A /1
ANALYZED BY : RLR
ANALYZED ON : 6-DEC-1996
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1206824001

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acetone	0.119 mg/Kg	< 0.119 mg/Kg	U
Benzene	0.006 mg/Kg	< 0.006 mg/Kg	U
Bromodichloromethane	0.006 mg/Kg	< 0.006 mg/Kg	U
Bromoform	0.006 mg/Kg	< 0.006 mg/Kg	U
Bromomethane	0.012 mg/Kg	< 0.012 mg/Kg	U
2-Butanone (MEK)	0.059 mg/Kg	< 0.059 mg/Kg	U
Carbon disulfide	0.006 mg/Kg	< 0.006 mg/Kg	U
Carbon tetrachloride	0.006 mg/Kg	< 0.006 mg/Kg	U
Chlorobenzene	0.006 mg/Kg	< 0.006 mg/Kg	U
Chlorodibromomethane	0.006 mg/Kg	< 0.006 mg/Kg	U
Chloroethane	0.012 mg/Kg	< 0.012 mg/Kg	U
2-Chloroethyl vinyl ether	0.012 mg/Kg	< 0.012 mg/Kg	U
Chloroform	0.006 mg/Kg	< 0.006 mg/Kg	U

Inchcape Testing Services
Environmental Laboratories

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-1
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : OTL-1
: N1#(20-20')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 3-DEC-1996
ANALYZED BY : RLR
ANALYZED ON : 6-DEC-1996
ANALYSIS METHOD : EPA 8240 /1
METHOD FACTOR : 1
QC BATCH NO : 1206824001

TENTATIVELY IDENTIFIED COMPOUNDS				
COMPOUND	RETENTION TIME	FRACTION	RESULT	FLAG
No compounds detected above		VOA	12 ug/Kg	N

Results are reported on Dry Weight basis.

Inchcape Testing Services
Environmental Laboratories

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-1
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : OTL-1
: N1#(20-20')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 3-DEC-1996

MISCELLANEOUS ANALYSES			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Solids /1	0.01 %	84.1 %	
Analyzed using ASTM D2216 mod. on 12-DEC-1996 by SAB QC Batch No : 1212221609			

Results are reported on Dry Weight basis.

REPORT NUMBER : D96-13833-2
ANALYSIS METHOD : EPA 8240A /1

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Chloromethane	0.011 mg/Kg	< 0.011 mg/Kg	U
1,1-Dichloroethane	0.005 mg/Kg	< 0.005 mg/Kg	U
1,2-Dichloroethane	0.005 mg/Kg	< 0.005 mg/Kg	U
1,1-Dichloroethene	0.005 mg/Kg	< 0.005 mg/Kg	U
cis-1,2-Dichloroethene	0.005 mg/Kg	< 0.005 mg/Kg	U
trans-1,2-Dichloroethene	0.005 mg/Kg	< 0.005 mg/Kg	U
1,2-Dichloropropane	0.005 mg/Kg	< 0.005 mg/Kg	U
cis-1,3-Dichloropropene	0.005 mg/Kg	< 0.005 mg/Kg	U
trans-1,3-Dichloropropene	0.005 mg/Kg	< 0.005 mg/Kg	U
Ethylbenzene	0.005 mg/Kg	< 0.005 mg/Kg	U
2-Hexanone	0.053 mg/Kg	< 0.053 mg/Kg	U
Methylene chloride	0.005 mg/Kg	< 0.005 mg/Kg	U
4-Methyl-2-pentanone	0.053 mg/Kg	< 0.053 mg/Kg	U
Styrene	0.005 mg/Kg	< 0.005 mg/Kg	U
1,1,2,2-Tetrachloroethane	0.005 mg/Kg	< 0.005 mg/Kg	U
Tetrachloroethene	0.005 mg/Kg	< 0.005 mg/Kg	U
Toluene	0.005 mg/Kg	0.008 mg/Kg	
1,1,1-Trichloroethane	0.005 mg/Kg	< 0.005 mg/Kg	U
1,1,2-Trichloroethane	0.005 mg/Kg	< 0.005 mg/Kg	U
Trichloroethene	0.005 mg/Kg	< 0.005 mg/Kg	U
Vinyl acetate	0.053 mg/Kg	< 0.053 mg/Kg	U
Vinyl chloride	0.002 mg/Kg	< 0.002 mg/Kg	U
m,p-Xylene	0.005 mg/Kg	< 0.005 mg/Kg	U
o-Xylene	0.005 mg/Kg	< 0.005 mg/Kg	U
1,2-Dichloroethane-d4 (SS)		0.048 mg/Kg	
Toluene-d8 (SS)		0.056 mg/Kg	
Bromofluorobenzene (SS)		0.050 mg/Kg	

Results are reported on Dry Weight basis.

Inchcape Testing Services
Environmental Laboratories

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-2
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : OTL-1
: N1#(25-25')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 3-DEC-1996
PREPARATION METHOD : EPA 3550A
PREPARED BY : MCP
PREPARED ON : 5-DEC-1996
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : MTW
ANALYZED ON : 11-DEC-1996
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1205801501

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	10.6 mg/Kg	< 10.6 mg/Kg	U
Triacontane (SS)		6.81 mg/Kg	

Results are reported on Dry Weight basis.

Inchcape Testing Services
Environmental Laboratories

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-3
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : OTL-2
: N1#(10-10')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 3-DEC-1996
PREPARATION METHOD : EPA 5030
PREPARED BY : RLR
PREPARED ON : 6-DEC-1996
ANALYSIS METHOD : EPA 8240A /1
ANALYZED BY : RLR
ANALYZED ON : 6-DEC-1996
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1206824001

VOLATILE ORGANICS				
TEST REQUESTED	DETECTION LIMIT		RESULTS	FLAG
Acetone	0.116 mg/Kg		0.072 mg/Kg	J
Benzene	0.006 mg/Kg	<	0.006 mg/Kg	U
Bromodichloromethane	0.006 mg/Kg	<	0.006 mg/Kg	U
Bromoform	0.006 mg/Kg	<	0.006 mg/Kg	U
Bromomethane	0.012 mg/Kg	<	0.012 mg/Kg	U
2-Butanone (MEK)	0.058 mg/Kg	<	0.058 mg/Kg	U
Carbon disulfide	0.006 mg/Kg	<	0.006 mg/Kg	U
Carbon tetrachloride	0.006 mg/Kg	<	0.006 mg/Kg	U
Chlorobenzene	0.006 mg/Kg	<	0.006 mg/Kg	U
Chlorodibromomethane	0.006 mg/Kg	<	0.006 mg/Kg	U
Chloroethane	0.012 mg/Kg	<	0.012 mg/Kg	U
2-Chloroethyl vinyl ether	0.012 mg/Kg	<	0.012 mg/Kg	U
Chloroform	0.006 mg/Kg	<	0.006 mg/Kg	U

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-3
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : OTL-2
: N1#(10-10')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 3-DEC-1996
ANALYZED BY : RLR
ANALYZED ON : 6-DEC-1996
ANALYSIS METHOD : EPA 8240 /1
METHOD FACTOR : 1
QC BATCH NO : 1206824001

TENTATIVELY IDENTIFIED COMPOUNDS				
COMPOUND	RETENTION TIME	FRACTION	RESULT	FLAG
No compounds detected above		VOA	12 ug/Kg	N

Results are reported on Dry Weight basis.

Inchcape Testing Services
Environmental Laboratories

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-3
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : OTL-2
: N1#(10-10')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 3-DEC-1996

MISCELLANEOUS ANALYSES			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Solids /1	0.01 %	86.4 %	
Analyzed using ASTM D2216 mod. on 12-DEC-1996 by SAB QC Batch No : 1212221609			

Results are reported on Dry Weight basis.

REPORT NUMBER : D96-13833-4 PAGE 2
ANALYSIS METHOD : EPA 8240A /1

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Chloromethane	0.012 mg/Kg	< 0.012 mg/Kg	U
1,1-Dichloroethane	0.006 mg/Kg	< 0.006 mg/Kg	U
1,2-Dichloroethane	0.006 mg/Kg	< 0.006 mg/Kg	U
1,1-Dichloroethene	0.006 mg/Kg	< 0.006 mg/Kg	U
cis-1,2-Dichloroethene	0.006 mg/Kg	< 0.006 mg/Kg	U
trans-1,2-Dichloroethene	0.006 mg/Kg	< 0.006 mg/Kg	U
1,2-Dichloropropane	0.006 mg/Kg	< 0.006 mg/Kg	U
cis-1,3-Dichloropropene	0.006 mg/Kg	< 0.006 mg/Kg	U
trans-1,3-Dichloropropene	0.006 mg/Kg	< 0.006 mg/Kg	U
Ethylbenzene	0.006 mg/Kg	< 0.006 mg/Kg	U
2-Hexanone	0.060 mg/Kg	< 0.060 mg/Kg	U
Methylene chloride	0.006 mg/Kg	< 0.006 mg/Kg	U
4-Methyl-2-pentanone	0.060 mg/Kg	< 0.060 mg/Kg	U
Styrene	0.006 mg/Kg	< 0.006 mg/Kg	U
1,1,2,2-Tetrachloroethane	0.006 mg/Kg	< 0.006 mg/Kg	U
Tetrachloroethene	0.006 mg/Kg	< 0.006 mg/Kg	U
Toluene	0.006 mg/Kg	0.007 mg/Kg	
1,1,1-Trichloroethane	0.006 mg/Kg	< 0.006 mg/Kg	U
1,1,2-Trichloroethane	0.006 mg/Kg	< 0.006 mg/Kg	U
Trichloroethene	0.006 mg/Kg	< 0.006 mg/Kg	U
Vinyl acetate	0.060 mg/Kg	< 0.060 mg/Kg	U
Vinyl chloride	0.002 mg/Kg	< 0.002 mg/Kg	U
m,p-Xylene	0.006 mg/Kg	< 0.006 mg/Kg	U
o-Xylene	0.006 mg/Kg	< 0.006 mg/Kg	U
1,2-Dichloroethane-d4 (SS)		0.054 mg/Kg	
Toluene-d8 (SS)		0.070 mg/Kg	
Bromofluorobenzene (SS)		0.052 mg/Kg	

Results are reported on Dry Weight basis.

REPORT NUMBER : D96-13833-4 PAGE 2
ANALYSIS METHOD : EPA 8240 /1

TENTATIVELY IDENTIFIED COMPOUNDS					
COMPOUND	RETENTION TIME	FRACTION	RESULT		FLAG
Naphthalene, decahydro-, trans-	11.33	VOA	156	ug/Kg	N
Benzene, 2-ethyl-1,4-dimethyl-	11.61	VOA	114	ug/Kg	N

Results are reported on Dry Weight basis.

Inchcape Testing Services
Environmental Laboratories

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-4
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : OTL-2
: N1#(25-25')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 3-DEC-1996

MISCELLANEOUS ANALYSES			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Solids /1	0.01 %	83.3 %	
Analyzed using ASTM D2216 mod. on 12-DEC-1996 by SAB QC Batch No : 1212221609			

Results are reported on Dry Weight basis.

REPORT NUMBER : D96-13833-5 PAGE 2
ANALYSIS METHOD : EPA 8240A /1

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Chloromethane	0.012 mg/Kg	< 0.012 mg/Kg	U
1,1-Dichloroethane	0.006 mg/Kg	< 0.006 mg/Kg	U
1,2-Dichloroethane	0.006 mg/Kg	< 0.006 mg/Kg	U
1,1-Dichloroethene	0.006 mg/Kg	< 0.006 mg/Kg	U
cis-1,2-Dichloroethene	0.006 mg/Kg	< 0.006 mg/Kg	U
trans-1,2-Dichloroethene	0.006 mg/Kg	< 0.006 mg/Kg	U
1,2-Dichloropropane	0.006 mg/Kg	< 0.006 mg/Kg	U
cis-1,3-Dichloropropene	0.006 mg/Kg	< 0.006 mg/Kg	U
trans-1,3-Dichloropropene	0.006 mg/Kg	< 0.006 mg/Kg	U
Ethylbenzene	0.006 mg/Kg	< 0.006 mg/Kg	U
2-Hexanone	0.059 mg/Kg	< 0.059 mg/Kg	U
Methylene chloride	0.006 mg/Kg	< 0.006 mg/Kg	U
4-Methyl-2-pentanone	0.059 mg/Kg	< 0.059 mg/Kg	U
Styrene	0.006 mg/Kg	< 0.006 mg/Kg	U
1,1,2,2-Tetrachloroethane	0.006 mg/Kg	< 0.006 mg/Kg	U
Tetrachloroethene	0.006 mg/Kg	< 0.006 mg/Kg	U
Toluene	0.006 mg/Kg	0.015 mg/Kg	
1,1,1-Trichloroethane	0.006 mg/Kg	< 0.006 mg/Kg	U
1,1,2-Trichloroethane	0.006 mg/Kg	< 0.006 mg/Kg	U
Trichloroethene	0.006 mg/Kg	< 0.006 mg/Kg	U
Vinyl acetate	0.059 mg/Kg	< 0.059 mg/Kg	U
Vinyl chloride	0.002 mg/Kg	< 0.002 mg/Kg	U
m,p-Xylene	0.006 mg/Kg	< 0.006 mg/Kg	U
o-Xylene	0.006 mg/Kg	< 0.006 mg/Kg	U
1,2-Dichloroethane-d4 (SS)		0.052 mg/Kg	
Toluene-d8 (SS)		0.063 mg/Kg	
Bromofluorobenzene (SS)		0.060 mg/Kg	

Results are reported on Dry Weight basis.

Inchcape Testing Services
Environmental Laboratories

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-5
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : OTL-3
: N1#(15-15')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 3-DEC-1996
PREPARATION METHOD : EPA 3550A
PREPARED BY : MCP
PREPARED ON : 5-DEC-1996
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 7-DEC-1996
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1205801501

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	11.8 mg/Kg	1020 mg/Kg	
Triacontane (SS)		6.33 mg/Kg	

Results are reported on Dry Weight basis.

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-6
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : OTL-3
: N1#(20-20')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 3-DEC-1996
PREPARATION METHOD : EPA 5030
PREPARED BY : RLR
PREPARED ON : 6-DEC-1996
ANALYSIS METHOD : EPA 8240A /1
ANALYZED BY : RLR
ANALYZED ON : 6-DEC-1996
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1206824001

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acetone	0.105 mg/Kg	< 0.105 mg/Kg	U
Benzene	0.005 mg/Kg	< 0.005 mg/Kg	U
Bromodichloromethane	0.005 mg/Kg	< 0.005 mg/Kg	U
Bromoform	0.005 mg/Kg	< 0.005 mg/Kg	U
Bromomethane	0.011 mg/Kg	< 0.011 mg/Kg	U
2-Butanone (MEK)	0.053 mg/Kg	< 0.053 mg/Kg	U
Carbon disulfide	0.005 mg/Kg	< 0.005 mg/Kg	U
Carbon tetrachloride	0.005 mg/Kg	< 0.005 mg/Kg	U
Chlorobenzene	0.005 mg/Kg	< 0.005 mg/Kg	U
Chlorodibromomethane	0.005 mg/Kg	< 0.005 mg/Kg	U
Chloroethane	0.011 mg/Kg	< 0.011 mg/Kg	U
2-Chloroethyl vinyl ether	0.011 mg/Kg	< 0.011 mg/Kg	U
Chloroform	0.005 mg/Kg	< 0.005 mg/Kg	U

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-6
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : OTL-3
: N1#(20-20')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 3-DEC-1996
ANALYZED BY : RLR
ANALYZED ON : 6-DEC-1996
ANALYSIS METHOD : EPA 8240 /1
METHOD FACTOR : 1
QC BATCH NO : 1206824001

TENTATIVELY IDENTIFIED COMPOUNDS					
COMPOUND	RETENTION TIME	FRACTION	RESULT		FLAG
Cyclohexane, methyl-	6.30	VOA	25	ug/Kg	N
Cyclohexane, 1,2,3-trimethyl-, (1.	8.39	VOA	61	ug/Kg	N
6-Octenal, 3,7-dimethyl-, (R)-	11.33	VOA	74	ug/Kg	N

Results are reported on Dry Weight basis.

Inchcape Testing Services
Environmental Laboratories

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-6
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : OTL-3
: N1#(20-20')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 3-DEC-1996

MISCELLANEOUS ANALYSES

TEST REQUESTED		DETECTION LIMIT	RESULTS	FLAG
Total Solids	/1	0.01 %	95.0 %	

Analyzed using ASTM D2216 mod. on 12-DEC-1996 by SAB
QC Batch No : 1212221609

Results are reported on Dry Weight basis.

REPORT NUMBER : D96-13833-7 PAGE 2
ANALYSIS METHOD : EPA 8240A /1

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Chloromethane	0.012 mg/Kg	< 0.012 mg/Kg	U
1,1-Dichloroethane	0.006 mg/Kg	< 0.006 mg/Kg	U
1,2-Dichloroethane	0.006 mg/Kg	< 0.006 mg/Kg	U
1,1-Dichloroethene	0.006 mg/Kg	< 0.006 mg/Kg	U
cis-1,2-Dichloroethene	0.006 mg/Kg	< 0.006 mg/Kg	U
trans-1,2-Dichloroethene	0.006 mg/Kg	< 0.006 mg/Kg	U
1,2-Dichloropropane	0.006 mg/Kg	< 0.006 mg/Kg	U
cis-1,3-Dichloropropene	0.006 mg/Kg	< 0.006 mg/Kg	U
trans-1,3-Dichloropropene	0.006 mg/Kg	< 0.006 mg/Kg	U
Ethylbenzene	0.006 mg/Kg	< 0.006 mg/Kg	U
2-Hexanone	0.058 mg/Kg	< 0.058 mg/Kg	U
Methylene chloride	0.006 mg/Kg	< 0.006 mg/Kg	U
4-Methyl-2-pentanone	0.058 mg/Kg	< 0.058 mg/Kg	U
Styrene	0.006 mg/Kg	< 0.006 mg/Kg	U
1,1,2,2-Tetrachloroethane	0.006 mg/Kg	< 0.006 mg/Kg	U
Tetrachloroethene	0.006 mg/Kg	< 0.006 mg/Kg	U
Toluene	0.006 mg/Kg	0.016 mg/Kg	
1,1,1-Trichloroethane	0.006 mg/Kg	< 0.006 mg/Kg	U
1,1,2-Trichloroethane	0.006 mg/Kg	< 0.006 mg/Kg	U
Trichloroethene	0.006 mg/Kg	< 0.006 mg/Kg	U
Vinyl acetate	0.058 mg/Kg	< 0.058 mg/Kg	U
Vinyl chloride	0.002 mg/Kg	< 0.002 mg/Kg	U
m,p-Xylene	0.006 mg/Kg	< 0.006 mg/Kg	U
o-Xylene	0.006 mg/Kg	< 0.006 mg/Kg	U
1,2-Dichloroethane-d4 (SS)		0.051 mg/Kg	
Toluene-d8 (SS)		0.062 mg/Kg	
Bromofluorobenzene (SS)		0.055 mg/Kg	

Results are reported on Dry Weight basis.

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-7
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : OTL-4
: N1#(15-15')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 3-DEC-1996
PREPARATION METHOD : EPA 3550A
PREPARED BY : MCP
PREPARED ON : 5-DEC-1996
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 7-DEC-1996
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1205801501

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	11.6 mg/Kg	278 mg/Kg	
Triacontane (SS)		6.11 mg/Kg	

Results are reported on Dry Weight basis.

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-8
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : OTL-4
: N1#(20-20')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 3-DEC-1996
PREPARATION METHOD : EPA 5030
PREPARED BY : RLR
PREPARED ON : 6-DEC-1996
ANALYSIS METHOD : EPA 8240A /1
ANALYZED BY : RLR
ANALYZED ON : 6-DEC-1996
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1206824001

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acetone	0.114 mg/Kg	< 0.114 mg/Kg	U
Benzene	0.006 mg/Kg	< 0.006 mg/Kg	U
Bromodichloromethane	0.006 mg/Kg	< 0.006 mg/Kg	U
Bromoform	0.006 mg/Kg	< 0.006 mg/Kg	U
Bromomethane	0.011 mg/Kg	< 0.011 mg/Kg	U
2-Butanone (MEK)	0.057 mg/Kg	< 0.057 mg/Kg	U
Carbon disulfide	0.006 mg/Kg	< 0.006 mg/Kg	U
Carbon tetrachloride	0.006 mg/Kg	< 0.006 mg/Kg	U
Chlorobenzene	0.006 mg/Kg	< 0.006 mg/Kg	U
Chlorodibromomethane	0.006 mg/Kg	< 0.006 mg/Kg	U
Chloroethane	0.011 mg/Kg	< 0.011 mg/Kg	U
2-Chloroethyl vinyl ether	0.011 mg/Kg	< 0.011 mg/Kg	U
Chloroform	0.006 mg/Kg	< 0.006 mg/Kg	U

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-8
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : OTL-4
: N1#(20-20')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 3-DEC-1996
ANALYZED BY : RLR
ANALYZED ON : 6-DEC-1996
ANALYSIS METHOD : EPA 8240 /1
METHOD FACTOR : 1
QC BATCH NO : 1206824001

TENTATIVELY IDENTIFIED COMPOUNDS					
COMPOUND	RETENTION TIME	FRACTION	RESULT		FLAG
Octane, 3-methyl-	8.51	VOA	26	ug/Kg	N
Octane, 2,6-dimethyl-	9.37	VOA	53	ug/Kg	N
Decane, 4-methyl-	10.50	VOA	285	ug/Kg	N
7-Octenal, 3,7-dimethyl-	11.34	VOA	92	ug/Kg	N
2-Hexyl-1-decanol	11.62	VOA	194	ug/Kg	N
Undecane, 2,6-dimethyl-	12.61	VOA	365	ug/Kg	N

Results are reported on Dry Weight basis.

Inchcape Testing Services
Environmental Laboratories

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-8
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : OTL-4
: N1#(20-20')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 3-DEC-1996

MISCELLANEOUS ANALYSES			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Solids /1	0.01 %	87.6 %	
Analyzed using ASTM D2216 mod. on 12-DEC-1996 by SAB QC Batch No : 1212221609			

Results are reported on Dry Weight basis.

REPORT NUMBER : D96-13833-9 PAGE 2
ANALYSIS METHOD : EPA 8240A /1

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Chloromethane	0.012 mg/Kg	< 0.012 mg/Kg	U
1,1-Dichloroethane	0.006 mg/Kg	< 0.006 mg/Kg	U
1,2-Dichloroethane	0.006 mg/Kg	< 0.006 mg/Kg	U
1,1-Dichloroethene	0.006 mg/Kg	< 0.006 mg/Kg	U
cis-1,2-Dichloroethene	0.006 mg/Kg	< 0.006 mg/Kg	U
trans-1,2-Dichloroethene	0.006 mg/Kg	< 0.006 mg/Kg	U
1,2-Dichloropropane	0.006 mg/Kg	< 0.006 mg/Kg	U
cis-1,3-Dichloropropene	0.006 mg/Kg	< 0.006 mg/Kg	U
trans-1,3-Dichloropropene	0.006 mg/Kg	< 0.006 mg/Kg	U
Ethylbenzene	0.006 mg/Kg	< 0.006 mg/Kg	U
2-Hexanone	0.059 mg/Kg	< 0.059 mg/Kg	U
Methylene chloride	0.006 mg/Kg	< 0.006 mg/Kg	U
4-Methyl-2-pentanone	0.059 mg/Kg	< 0.059 mg/Kg	U
Styrene	0.006 mg/Kg	< 0.006 mg/Kg	U
1,1,2,2-Tetrachloroethane	0.006 mg/Kg	< 0.006 mg/Kg	U
Tetrachloroethene	0.006 mg/Kg	< 0.006 mg/Kg	U
Toluene	0.006 mg/Kg	< 0.006 mg/Kg	U
1,1,1-Trichloroethane	0.006 mg/Kg	< 0.006 mg/Kg	U
1,1,2-Trichloroethane	0.006 mg/Kg	< 0.006 mg/Kg	U
Trichloroethene	0.006 mg/Kg	< 0.006 mg/Kg	U
Vinyl acetate	0.059 mg/Kg	< 0.059 mg/Kg	U
Vinyl chloride	0.002 mg/Kg	< 0.002 mg/Kg	U
m,p-Xylene	0.006 mg/Kg	< 0.006 mg/Kg	U
o-Xylene	0.006 mg/Kg	< 0.006 mg/Kg	U
1,2-Dichloroethane-d4 (SS)		0.051 mg/Kg	
Toluene-d8 (SS)		0.066 mg/Kg	
Bromofluorobenzene (SS)		0.053 mg/Kg	

Results are reported on Dry Weight basis.

Inchcape Testing Services
Environmental Laboratories

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-9
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : OTL-7
: N1#(10-10')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 3-DEC-1996
PREPARATION METHOD : EPA 3550A
PREPARED BY : MCP
PREPARED ON : 5-DEC-1996
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 7-DEC-1996
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1205801501

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	11.9 mg/Kg	< 11.9 mg/Kg	U
Triacontane (SS)		6.75 mg/Kg	

Results are reported on Dry Weight basis.

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-10
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : OTL-7
: NN#(20-20')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 3-DEC-1996
PREPARATION METHOD : EPA 5030
PREPARED BY : RLR
PREPARED ON : 6-DEC-1996
ANALYSIS METHOD : EPA 8240A /1
ANALYZED BY : RLR
ANALYZED ON : 6-DEC-1996
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1206824002

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acetone	0.105 mg/Kg	< 0.105 mg/Kg	U
Benzene	0.005 mg/Kg	< 0.005 mg/Kg	U
Bromodichloromethane	0.005 mg/Kg	< 0.005 mg/Kg	U
Bromoform	0.005 mg/Kg	< 0.005 mg/Kg	U
Bromomethane	0.011 mg/Kg	< 0.011 mg/Kg	U
2-Butanone (MEK)	0.053 mg/Kg	< 0.053 mg/Kg	U
Carbon disulfide	0.005 mg/Kg	< 0.005 mg/Kg	U
Carbon tetrachloride	0.005 mg/Kg	< 0.005 mg/Kg	U
Chlorobenzene	0.005 mg/Kg	< 0.005 mg/Kg	U
Chlorodibromomethane	0.005 mg/Kg	< 0.005 mg/Kg	U
Chloroethane	0.011 mg/Kg	< 0.011 mg/Kg	U
2-Chloroethyl vinyl ether	0.011 mg/Kg	< 0.011 mg/Kg	U
Chloroform	0.005 mg/Kg	< 0.005 mg/Kg	U

Inchcape Testing Services
Environmental Laboratories

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-10
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : OTL-7
: NN#(20-20')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 3-DEC-1996
ANALYZED BY : RLR
ANALYZED ON : 6-DEC-1996
ANALYSIS METHOD : EPA 8240 /1
METHOD FACTOR : 1
QC BATCH NO : 1206824002

TENTATIVELY IDENTIFIED COMPOUNDS				
COMPOUND	RETENTION TIME	FRACTION	RESULT	FLAG
Ethyl Acetate	4.82	VOA	12 ug/Kg	N

Results are reported on Dry Weight basis.

Inchcape Testing Services
Environmental Laboratories

1089 E. Collins Blvd.
Richardson, TX 75081
Tel. 972-238-5591
Fax 972-238-5592

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-10
REPORT DATE : 15-JAN-1997

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : OTL-7
: NN#(20-20')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 3-DEC-1996

MISCELLANEOUS ANALYSES				
TEST REQUESTED		DETECTION LIMIT	RESULTS	FLAG
Total Solids	/1	0.01 %	95.1 %	
Analyzed using ASTM D2216 mod. on 12-DEC-1996 by SAB QC Batch No : 1212221609				
Total Organic Carbon	/1	210 mg/Kg	306 mg/Kg	
Dilution Factor : 1 Analyzed using EPA 9060 on 8-JAN-1997 by KPP QC Batch No : AB786048				

Results are reported on Dry Weight basis.

REPORT NUMBER : D96-13833-11 PAGE 2
ANALYSIS METHOD : EPA 8240A /1

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Chloromethane	0.012 mg/Kg	0.015 mg/Kg	
1,1-Dichloroethane	0.006 mg/Kg	< 0.006 mg/Kg	U
1,2-Dichloroethane	0.006 mg/Kg	< 0.006 mg/Kg	U
1,1-Dichloroethene	0.006 mg/Kg	< 0.006 mg/Kg	U
cis-1,2-Dichloroethene	0.006 mg/Kg	< 0.006 mg/Kg	U
trans-1,2-Dichloroethene	0.006 mg/Kg	< 0.006 mg/Kg	U
1,2-Dichloropropane	0.006 mg/Kg	< 0.006 mg/Kg	U
cis-1,3-Dichloropropene	0.006 mg/Kg	< 0.006 mg/Kg	U
trans-1,3-Dichloropropene	0.006 mg/Kg	< 0.006 mg/Kg	U
Ethylbenzene	0.006 mg/Kg	< 0.006 mg/Kg	U
2-Hexanone	0.058 mg/Kg	< 0.058 mg/Kg	U
Methylene chloride	0.006 mg/Kg	< 0.006 mg/Kg	U
4-Methyl-2-pentanone	0.058 mg/Kg	< 0.058 mg/Kg	U
Styrene	0.006 mg/Kg	< 0.006 mg/Kg	U
1,1,2,2-Tetrachloroethane	0.006 mg/Kg	< 0.006 mg/Kg	U
Tetrachloroethene	0.006 mg/Kg	< 0.006 mg/Kg	U
Toluene	0.006 mg/Kg	< 0.006 mg/Kg	U
1,1,1-Trichloroethane	0.006 mg/Kg	< 0.006 mg/Kg	U
1,1,2-Trichloroethane	0.006 mg/Kg	< 0.006 mg/Kg	U
Trichloroethene	0.006 mg/Kg	< 0.006 mg/Kg	U
Vinyl acetate	0.058 mg/Kg	< 0.058 mg/Kg	U
Vinyl chloride	0.002 mg/Kg	< 0.002 mg/Kg	U
m,p-Xylene	0.006 mg/Kg	< 0.006 mg/Kg	U
o-Xylene	0.006 mg/Kg	< 0.006 mg/Kg	U
1,2-Dichloroethane-d4 (SS)		0.057 mg/Kg	
Toluene-d8 (SS)		0.061 mg/Kg	
Bromofluorobenzene (SS)		0.066 mg/Kg	

Results are reported on Dry Weight basis.

Inchcape Testing Services
Environmental Laboratories

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-11
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : OTL-5
: N1#(15-15')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 4-DEC-1996
PREPARATION METHOD : EPA 3550A
PREPARED BY : MCP
PREPARED ON : 5-DEC-1996
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 9-DEC-1996
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1205801501

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	11.6 mg/Kg	< 11.6 mg/Kg	U
Triacontane (SS)		6.18 mg/Kg	

Results are reported on Dry Weight basis.

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-12
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : OTL-5
: N1#(20-20')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 4-DEC-1996
PREPARATION METHOD : EPA 5030
PREPARED BY : RLR
PREPARED ON : 6-DEC-1996
ANALYSIS METHOD : EPA 8240A /1
ANALYZED BY : RLR
ANALYZED ON : 6-DEC-1996
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1206824002

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acetone	0.106 mg/Kg	< 0.106 mg/Kg	U
Benzene	0.005 mg/Kg	< 0.005 mg/Kg	U
Bromodichloromethane	0.005 mg/Kg	< 0.005 mg/Kg	U
Bromoform	0.005 mg/Kg	< 0.005 mg/Kg	U
Bromomethane	0.011 mg/Kg	< 0.011 mg/Kg	U
2-Butanone (MEK)	0.053 mg/Kg	< 0.053 mg/Kg	U
Carbon disulfide	0.005 mg/Kg	< 0.005 mg/Kg	U
Carbon tetrachloride	0.005 mg/Kg	< 0.005 mg/Kg	U
Chlorobenzene	0.005 mg/Kg	< 0.005 mg/Kg	U
Chlorodibromomethane	0.005 mg/Kg	< 0.005 mg/Kg	U
Chloroethane	0.011 mg/Kg	< 0.011 mg/Kg	U
2-Chloroethyl vinyl ether	0.011 mg/Kg	< 0.011 mg/Kg	U
Chloroform	0.005 mg/Kg	< 0.005 mg/Kg	U

Inchcape Testing Services
Environmental Laboratories

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-12
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : OTL-5
: N1#(20-20')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 4-DEC-1996
ANALYZED BY : RLR
ANALYZED ON : 6-DEC-1996
ANALYSIS METHOD : EPA 8240 /1
METHOD FACTOR : 1
QC BATCH NO : 1206824002

TENTATIVELY IDENTIFIED COMPOUNDS					
COMPOUND	RETENTION TIME	FRACTION	RESULT		FLAG
Cyclohexane, methyl-	6.32	VOA	38	ug/Kg	N
Heptane, 2-methyl-	6.90	VOA	30	ug/Kg	N
Octane	7.43	VOA	70	ug/Kg	N
2-Hexene, 2,3-dimethyl-	8.15	VOA	100	ug/Kg	N
Octane, 4-methyl-	8.40	VOA	86	ug/Kg	N
Octane, 3-methyl-	8.52	VOA	42	ug/Kg	N
1-Ethyl-3-methylcyclohexane (c,t)	9.22	VOA	75	ug/Kg	N
Octane, 2,6-dimethyl-	9.39	VOA	48	ug/Kg	N
Benzene, 1,2,3-trimethyl-	10.60	VOA	61	ug/Kg	N
Benzene, (1-methylpropyl)-	11.24	VOA	22	ug/Kg	N
Benzene, 1,2-diethyl-	11.32	VOA	60	ug/Kg	N
Benzene, 1-methyl-4-(1-methylethyl	11.62	VOA	50	ug/Kg	N
Benzene, (2-methyl-1-propenyl)-	11.83	VOA	25	ug/Kg	N
Benzene, 1-ethyl-2,4-dimethyl-	12.55	VOA	21	ug/Kg	N

Results are reported on Dry Weight basis.

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-12
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : OTL-5
: N1#(20-20')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 4-DEC-1996

MISCELLANEOUS ANALYSES			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Solids /1	0.01 %	94.7 %	
Analyzed using ASTM D2216 mod. on 12-DEC-1996 by SAB QC Batch No : 1212221610			

Results are reported on Dry Weight basis.

REPORT NUMBER : D96-13833-13 PAGE 2
ANALYSIS METHOD : EPA 8240A /1

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Chloromethane	0.012 mg/Kg	0.028 mg/Kg	
1,1-Dichloroethane	0.006 mg/Kg	< 0.006 mg/Kg	U
1,2-Dichloroethane	0.006 mg/Kg	< 0.006 mg/Kg	U
1,1-Dichloroethene	0.006 mg/Kg	< 0.006 mg/Kg	U
cis-1,2-Dichloroethene	0.006 mg/Kg	< 0.006 mg/Kg	U
trans-1,2-Dichloroethene	0.006 mg/Kg	< 0.006 mg/Kg	U
1,2-Dichloropropane	0.006 mg/Kg	< 0.006 mg/Kg	U
cis-1,3-Dichloropropene	0.006 mg/Kg	< 0.006 mg/Kg	U
trans-1,3-Dichloropropene	0.006 mg/Kg	< 0.006 mg/Kg	U
Ethylbenzene	0.006 mg/Kg	< 0.006 mg/Kg	U
2-Hexanone	0.059 mg/Kg	< 0.059 mg/Kg	U
Methylene chloride	0.006 mg/Kg	< 0.006 mg/Kg	U
4-Methyl-2-pentanone	0.059 mg/Kg	< 0.059 mg/Kg	U
Styrene	0.006 mg/Kg	< 0.006 mg/Kg	U
1,1,2,2-Tetrachloroethane	0.006 mg/Kg	< 0.006 mg/Kg	U
Tetrachloroethene	0.006 mg/Kg	< 0.006 mg/Kg	U
Toluene	0.006 mg/Kg	< 0.006 mg/Kg	U
1,1,1-Trichloroethane	0.006 mg/Kg	< 0.006 mg/Kg	U
1,1,2-Trichloroethane	0.006 mg/Kg	< 0.006 mg/Kg	U
Trichloroethene	0.006 mg/Kg	< 0.006 mg/Kg	U
Vinyl acetate	0.059 mg/Kg	< 0.059 mg/Kg	U
Vinyl chloride	0.002 mg/Kg	< 0.002 mg/Kg	U
m,p-Xylene	0.006 mg/Kg	< 0.006 mg/Kg	U
o-Xylene	0.006 mg/Kg	< 0.006 mg/Kg	U
1,2-Dichloroethane-d4 (SS)		0.051 mg/Kg	
Toluene-d8 (SS)		0.063 mg/Kg	
Bromofluorobenzene (SS)		0.061 mg/Kg	

Results are reported on Dry Weight basis.

Inchcape Testing Services
Environmental Laboratories

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-13
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : OTL-6
: N1#(5-5')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 4-DEC-1996
PREPARATION METHOD : EPA 3550A
PREPARED BY : MCP
PREPARED ON : 5-DEC-1996
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 7-DEC-1996
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1205801501

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	11.7 mg/Kg	< 11.7 mg/Kg	U
Triacontane (SS)		6.53 mg/Kg	

Results are reported on Dry Weight basis.

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-14
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : OTL-6
: N1#(20-20')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 4-DEC-1996
PREPARATION METHOD : EPA 5030
PREPARED BY : RLR
PREPARED ON : 6-DEC-1996
ANALYSIS METHOD : EPA 8240A /1
ANALYZED BY : RLR
ANALYZED ON : 6-DEC-1996
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1206824002

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acetone	0.100 mg/Kg	< 0.100 mg/Kg	U
Benzene	0.005 mg/Kg	< 0.005 mg/Kg	U
Bromodichloromethane	0.005 mg/Kg	< 0.005 mg/Kg	U
Bromoform	0.005 mg/Kg	< 0.005 mg/Kg	U
Bromomethane	0.010 mg/Kg	< 0.010 mg/Kg	U
2-Butanone (MEK)	0.050 mg/Kg	< 0.050 mg/Kg	U
Carbon disulfide	0.005 mg/Kg	< 0.005 mg/Kg	U
Carbon tetrachloride	0.005 mg/Kg	< 0.005 mg/Kg	U
Chlorobenzene	0.005 mg/Kg	< 0.005 mg/Kg	U
Chlorodibromomethane	0.005 mg/Kg	< 0.005 mg/Kg	U
Chloroethane	0.010 mg/Kg	< 0.010 mg/Kg	U
2-Chloroethyl vinyl ether	0.010 mg/Kg	< 0.010 mg/Kg	U
Chloroform	0.005 mg/Kg	< 0.005 mg/Kg	U

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-14
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : OTL-6
: N1#(20-20')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 4-DEC-1996
ANALYZED BY : RLR
ANALYZED ON : 6-DEC-1996
ANALYSIS METHOD : EPA 8240 /1
METHOD FACTOR : 1
QC BATCH NO : 1206824002

TENTATIVELY IDENTIFIED COMPOUNDS					
COMPOUND	RETENTION TIME	FRACTION	RESULT		FLAG
Cyclohexane, 1,2,4-trimethyl-	8.17	VOA	26	ug/Kg	N
Octane, 4-methyl-	8.38	VOA	40	ug/Kg	N
Octane, 3-methyl-	8.51	VOA	14	ug/Kg	N
1-Ethyl-3-methylcyclohexane (c,t)	8.91	VOA	58	ug/Kg	N
Cyclohexane, 1,3-dimethyl-, trans-	9.22	VOA	86	ug/Kg	N
Octane, 2,6-dimethyl-	9.37	VOA	57	ug/Kg	N
Decane, 4-methyl-	10.50	VOA	76	ug/Kg	N
Naphthalene, decahydro-, trans-	11.34	VOA	85	ug/Kg	N
1-Eicosanol	11.62	VOA	57	ug/Kg	N

Results are reported on Dry Weight basis.

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-15
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : OTL-8
: N1#(5-5')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 4-DEC-1996
PREPARATION METHOD : EPA 5030
PREPARED BY : RLR
PREPARED ON : 6-DEC-1996
ANALYSIS METHOD : EPA 8240A /1
ANALYZED BY : RLR
ANALYZED ON : 6-DEC-1996
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1206824002

VOLATILE ORGANICS				
TEST REQUESTED	DETECTION LIMIT		RESULTS	FLAG
Acetone	0.116 mg/Kg	<	0.116 mg/Kg	U
Benzene	0.006 mg/Kg	<	0.006 mg/Kg	U
Bromodichloromethane	0.006 mg/Kg	<	0.006 mg/Kg	U
Bromoform	0.006 mg/Kg	<	0.006 mg/Kg	U
Bromomethane	0.012 mg/Kg	<	0.012 mg/Kg	U
2-Butanone (MEK)	0.058 mg/Kg	<	0.058 mg/Kg	U
Carbon disulfide	0.006 mg/Kg	<	0.006 mg/Kg	U
Carbon tetrachloride	0.006 mg/Kg	<	0.006 mg/Kg	U
Chlorobenzene	0.006 mg/Kg	<	0.006 mg/Kg	U
Chlorodibromomethane	0.006 mg/Kg	<	0.006 mg/Kg	U
Chloroethane	0.012 mg/Kg	<	0.012 mg/Kg	U
2-Chloroethyl vinyl ether	0.012 mg/Kg	<	0.012 mg/Kg	U
Chloroform	0.006 mg/Kg	<	0.006 mg/Kg	U

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-15
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : OTL-8
: N1#(5-5')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 4-DEC-1996
ANALYZED BY : RLR
ANALYZED ON : 6-DEC-1996
ANALYSIS METHOD : EPA 8240 /1
METHOD FACTOR : 1
QC BATCH NO : 1206824002

TENTATIVELY IDENTIFIED COMPOUNDS				
COMPOUND	RETENTION TIME	FRACTION	RESULT	FLAG
No compounds detected above		VOA	12 ug/Kg	N

Results are reported on Dry Weight basis.

Inchcape Testing Services
Environmental Laboratories

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-15
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : OTL-8
: N1#(5-5')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 4-DEC-1996

MISCELLANEOUS ANALYSES			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Solids /1	0.01 %	85.9 %	
Analyzed using ASTM D2216 mod. on 12-DEC-1996 by SAB QC Batch No : 1212221610			

Results are reported on Dry Weight basis.

REPORT NUMBER : D96-13833-16
ANALYSIS METHOD : EPA 8240A /1

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Chloromethane	0.011 mg/Kg	< 0.011 mg/Kg	U
1,1-Dichloroethane	0.005 mg/Kg	< 0.005 mg/Kg	U
1,2-Dichloroethane	0.005 mg/Kg	< 0.005 mg/Kg	U
1,1-Dichloroethene	0.005 mg/Kg	< 0.005 mg/Kg	U
cis-1,2-Dichloroethene	0.005 mg/Kg	< 0.005 mg/Kg	U
trans-1,2-Dichloroethene	0.005 mg/Kg	< 0.005 mg/Kg	U
1,2-Dichloropropane	0.005 mg/Kg	< 0.005 mg/Kg	U
cis-1,3-Dichloropropene	0.005 mg/Kg	< 0.005 mg/Kg	U
trans-1,3-Dichloropropene	0.005 mg/Kg	< 0.005 mg/Kg	U
Ethylbenzene	0.005 mg/Kg	< 0.005 mg/Kg	U
2-Hexanone	0.055 mg/Kg	< 0.055 mg/Kg	U
Methylene chloride	0.005 mg/Kg	< 0.005 mg/Kg	U
4-Methyl-2-pentanone	0.055 mg/Kg	< 0.055 mg/Kg	U
Styrene	0.005 mg/Kg	< 0.005 mg/Kg	U
1,1,2,2-Tetrachloroethane	0.005 mg/Kg	< 0.005 mg/Kg	U
Tetrachloroethene	0.005 mg/Kg	< 0.005 mg/Kg	U
Toluene	0.005 mg/Kg	0.018 mg/Kg	
1,1,1-Trichloroethane	0.005 mg/Kg	< 0.005 mg/Kg	U
1,1,2-Trichloroethane	0.005 mg/Kg	< 0.005 mg/Kg	U
Trichloroethene	0.005 mg/Kg	< 0.005 mg/Kg	U
Vinyl acetate	0.055 mg/Kg	< 0.055 mg/Kg	U
Vinyl chloride	0.002 mg/Kg	< 0.002 mg/Kg	U
m,p-Xylene	0.005 mg/Kg	< 0.005 mg/Kg	U
o-Xylene	0.005 mg/Kg	< 0.005 mg/Kg	U
1,2-Dichloroethane-d4 (SS)		0.050 mg/Kg	
Toluene-d8 (SS)		0.060 mg/Kg	
Bromofluorobenzene (SS)		0.049 mg/Kg	

Results are reported on Dry Weight basis.

Inchcape Testing Services
Environmental Laboratories

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-16
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : OTL-8
: N1#(10-10')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 4-DEC-1996
PREPARATION METHOD : EPA 3550A
PREPARED BY : MCP
PREPARED ON : 5-DEC-1996
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 7-DEC-1996
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1205801501

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	10.9 mg/Kg	15.5 mg/Kg	
Triacontane (SS)		7.42 mg/Kg	

Results are reported on Dry Weight basis.

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-17
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : OTL-18
: N1#(10-10')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 4-DEC-1996
PREPARATION METHOD : EPA 5030
PREPARED BY : RLR
PREPARED ON : 9-DEC-1996
ANALYSIS METHOD : EPA 8240A /1
ANALYZED BY : RLR
ANALYZED ON : 9-DEC-1996
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1209824001

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acetone	0.120 mg/Kg	0.091 mg/Kg	J
Benzene	0.006 mg/Kg	< 0.006 mg/Kg	U
Bromodichloromethane	0.006 mg/Kg	< 0.006 mg/Kg	U
Bromoform	0.006 mg/Kg	< 0.006 mg/Kg	U
Bromomethane	0.012 mg/Kg	< 0.012 mg/Kg	U
2-Butanone (MEK)	0.060 mg/Kg	< 0.060 mg/Kg	U
Carbon disulfide	0.006 mg/Kg	< 0.006 mg/Kg	U
Carbon tetrachloride	0.006 mg/Kg	< 0.006 mg/Kg	U
Chlorobenzene	0.006 mg/Kg	< 0.006 mg/Kg	U
Chlorodibromomethane	0.006 mg/Kg	< 0.006 mg/Kg	U
Chloroethane	0.012 mg/Kg	< 0.012 mg/Kg	U
2-Chloroethyl vinyl ether	0.012 mg/Kg	< 0.012 mg/Kg	U
Chloroform	0.006 mg/Kg	< 0.006 mg/Kg	U

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-17
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : OTL-18
: N1#(10-10')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 4-DEC-1996
ANALYZED BY : RLR
ANALYZED ON : 9-DEC-1996
ANALYSIS METHOD : EPA 8240 /1
METHOD FACTOR : 1
QC BATCH NO : 1209824001

TENTATIVELY IDENTIFIED COMPOUNDS				
COMPOUND	RETENTION TIME	FRACTION	RESULT	FLAG
Naphthalene, 1-methyl-	10.22	VOA	7.5 ug/Kg	N

Results are reported on Dry Weight basis.

Inchcape Testing Services
Environmental Laboratories

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-17
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : OTL-18
: N1#(10-10')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 4-DEC-1996

MISCELLANEOUS ANALYSES			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Solids /1	0.01 %	83.2 %	
Analyzed using ASTM D2216 mod. on 12-DEC-1996 by SAB QC Batch No : 1212221610			

Results are reported on Dry Weight basis.

REPORT NUMBER : D96-13833-18
ANALYSIS METHOD : EPA 8240A /1

VOLATILE ORGANICS				
TEST REQUESTED	DETECTION LIMIT		RESULTS	FLAG
Chloromethane	10.0 µg/L	<	10.0 µg/L	U
1,1-Dichloroethane	5.0 µg/L	<	5.0 µg/L	U
1,2-Dichloroethane	5.0 µg/L	<	5.0 µg/L	U
1,1-Dichloroethene	5.0 µg/L	<	5.0 µg/L	U
cis-1,2-Dichloroethene	5.0 µg/L	<	5.0 µg/L	U
trans-1,2-Dichloroethene	5.0 µg/L	<	5.0 µg/L	U
1,2-Dichloropropane	5.0 µg/L	<	5.0 µg/L	U
cis-1,3-Dichloropropene	5.0 µg/L	<	5.0 µg/L	U
trans-1,3-Dichloropropene	5.0 µg/L	<	5.0 µg/L	U
Ethylbenzene	5.0 µg/L	<	5.0 µg/L	U
2-Hexanone	50.0 µg/L	<	50.0 µg/L	U
Methylene chloride	5.0 µg/L	<	5.0 µg/L	U
4-Methyl-2-pentanone	50.0 µg/L	<	50.0 µg/L	U
Styrene	5.0 µg/L	<	5.0 µg/L	U
1,1,2,2-Tetrachloroethane	5.0 µg/L	<	5.0 µg/L	U
Tetrachloroethene	5.0 µg/L	<	5.0 µg/L	U
Toluene	5.0 µg/L	<	5.0 µg/L	U
1,1,1-Trichloroethane	5.0 µg/L	<	5.0 µg/L	U
1,1,2-Trichloroethane	5.0 µg/L	<	5.0 µg/L	U
Trichloroethene	5.0 µg/L	<	5.0 µg/L	U
Vinyl acetate	50.0 µg/L	<	50.0 µg/L	U
Vinyl chloride	2.0 µg/L	<	2.0 µg/L	U
m,p-Xylene	5.0 µg/L	<	5.0 µg/L	U
o-Xylene	5.0 µg/L	<	5.0 µg/L	U
1,2-Dichloroethane-d4 (SS)			48.9 µg/L	
Toluene-d8 (SS)			49.9 µg/L	
Bromofluorobenzene (SS)			44.5 µg/L	

Results are reported on Dry Weight basis.

Inchcape Testing Services
Environmental Laboratories

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-18
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : FIELDQC#
: EB1#(0-0')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 4-DEC-1996
PREPARATION METHOD : EPA 3510B
PREPARED BY : JMR
PREPARED ON : 5-DEC-1996
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 6-DEC-1996
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1205801502

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	1000 µg/L	< 1000 µg/L	U
Triacontane (SS)		117 µg/L	

Results are reported on Dry Weight basis.

REPORT NUMBER : D96-13833-19
ANALYSIS METHOD : EPA 8240A /1

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Chloromethane	0.010 mg/Kg	< 0.010 mg/Kg	U
1,1-Dichloroethane	0.005 mg/Kg	< 0.005 mg/Kg	U
1,2-Dichloroethane	0.005 mg/Kg	< 0.005 mg/Kg	U
1,1-Dichloroethene	0.005 mg/Kg	< 0.005 mg/Kg	U
cis-1,2-Dichloroethene	0.005 mg/Kg	< 0.005 mg/Kg	U
trans-1,2-Dichloroethene	0.005 mg/Kg	< 0.005 mg/Kg	U
1,2-Dichloropropane	0.005 mg/Kg	< 0.005 mg/Kg	U
cis-1,3-Dichloropropene	0.005 mg/Kg	< 0.005 mg/Kg	U
trans-1,3-Dichloropropene	0.005 mg/Kg	< 0.005 mg/Kg	U
Ethylbenzene	0.005 mg/Kg	< 0.005 mg/Kg	U
2-Hexanone	0.050 mg/Kg	< 0.050 mg/Kg	U
Methylene chloride	0.005 mg/Kg	< 0.005 mg/Kg	U
4-Methyl-2-pentanone	0.050 mg/Kg	< 0.050 mg/Kg	U
Styrene	0.005 mg/Kg	< 0.005 mg/Kg	U
1,1,2,2-Tetrachloroethane	0.005 mg/Kg	< 0.005 mg/Kg	U
Tetrachloroethene	0.005 mg/Kg	< 0.005 mg/Kg	U
Toluene	0.005 mg/Kg	< 0.005 mg/Kg	U
1,1,1-Trichloroethane	0.005 mg/Kg	< 0.005 mg/Kg	U
1,1,2-Trichloroethane	0.005 mg/Kg	< 0.005 mg/Kg	U
Trichloroethene	0.005 mg/Kg	< 0.005 mg/Kg	U
Vinyl acetate	0.050 mg/Kg	< 0.050 mg/Kg	U
Vinyl chloride	0.002 mg/Kg	< 0.002 mg/Kg	U
m,p-Xylene	0.005 mg/Kg	< 0.005 mg/Kg	U
o-Xylene	0.005 mg/Kg	< 0.005 mg/Kg	U
1,2-Dichloroethane-d4 (SS)		43.6 mg/Kg	
Toluene-d8 (SS)		51.7 mg/Kg	
Bromofluorobenzene (SS)		50.6 mg/Kg	

Results are reported on Dry Weight basis.

Inchcape Testing Services
Environmental Laboratories

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-19
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Soil/Solid Quality Control for IRPIMS
ID MARKS : LABQC#
: LB1#(0-0')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 5-DEC-1996
PREPARATION METHOD : EPA 3550A
PREPARED BY : MCP
PREPARED ON : 5-DEC-1996
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 6-DEC-1996
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1205801501

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	10.0 mg/Kg	< 10.0 mg/Kg	U
Triacontane (SS)		5.24 mg/Kg	

Results are reported on Dry Weight basis.

REPORT NUMBER : D96-13833-20
ANALYSIS METHOD : EPA 8240A /1

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Chloromethane	0.010 mg/Kg	0.037 mg/Kg	
1,1-Dichloroethane	0.005 mg/Kg	0.048 mg/Kg	
1,2-Dichloroethane	0.005 mg/Kg	0.044 mg/Kg	
1,1-Dichloroethene	0.005 mg/Kg	0.043 mg/Kg	
cis-1,2-Dichloroethene	0.005 mg/Kg	0.049 mg/Kg	
trans-1,2-Dichloroethene	0.005 mg/Kg	0.044 mg/Kg	
1,2-Dichloropropane	0.005 mg/Kg	0.047 mg/Kg	
cis-1,3-Dichloropropene	0.005 mg/Kg	0.047 mg/Kg	
trans-1,3-Dichloropropene	0.005 mg/Kg	0.047 mg/Kg	
Ethylbenzene	0.005 mg/Kg	0.048 mg/Kg	
2-Hexanone	0.050 mg/Kg	0.055 mg/Kg	
Methylene chloride	0.005 mg/Kg	0.045 mg/Kg	
4-Methyl-2-pentanone	0.050 mg/Kg	0.051 mg/Kg	
Styrene	0.005 mg/Kg	0.049 mg/Kg	
1,1,2,2-Tetrachloroethane	0.005 mg/Kg	0.057 mg/Kg	
Tetrachloroethene	0.005 mg/Kg	0.044 mg/Kg	
Toluene	0.005 mg/Kg	0.046 mg/Kg	
1,1,1-Trichloroethane	0.005 mg/Kg	0.046 mg/Kg	
1,1,2-Trichloroethane	0.005 mg/Kg	0.049 mg/Kg	
Trichloroethene	0.005 mg/Kg	0.047 mg/Kg	
Vinyl acetate	0.050 mg/Kg	0.053 mg/Kg	
Vinyl chloride	0.002 mg/Kg	0.041 mg/Kg	
m,p-Xylene	0.005 mg/Kg	0.095 mg/Kg	
o-Xylene	0.005 mg/Kg	0.048 mg/Kg	
1,2-Dichloroethane-d4 (SS)		44.1 mg/Kg	
Toluene-d8 (SS)		50.6 mg/Kg	
Bromofluorobenzene (SS)		48.6 mg/Kg	

Results are reported on Dry Weight basis.

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-21
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : OTL-5#
: MS1#(15-15')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 4-DEC-1996
PREPARATION METHOD : EPA 5030
PREPARED BY : RLR
PREPARED ON : 6-DEC-1996
ANALYSIS METHOD : EPA 8240A /1
ANALYZED BY : RLR
ANALYZED ON : 6-DEC-1996
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1206824002

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acetone	0.116 mg/Kg	0.123 mg/Kg	
Benzene	0.006 mg/Kg	0.055 mg/Kg	
Bromodichloromethane	0.006 mg/Kg	0.054 mg/Kg	
Bromoform	0.006 mg/Kg	0.063 mg/Kg	
Bromomethane	0.012 mg/Kg	0.054 mg/Kg	
2-Butanone (MEK)	0.058 mg/Kg	< 0.058 mg/Kg	U
Carbon disulfide	0.006 mg/Kg	0.037 mg/Kg	
Carbon tetrachloride	0.006 mg/Kg	0.038 mg/Kg	
Chlorobenzene	0.006 mg/Kg	0.057 mg/Kg	
Chlorodibromomethane	0.006 mg/Kg	0.061 mg/Kg	
Chloroethane	0.012 mg/Kg	0.061 mg/Kg	
2-Chloroethyl vinyl ether	0.012 mg/Kg	< 0.012 mg/Kg	U
Chloroform	0.006 mg/Kg	0.059 mg/Kg	

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Environmental Laboratories

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-21
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : OTL-5#
: MS1#(15-15')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 4-DEC-1996
PREPARATION METHOD : EPA 3550A
PREPARED BY : MCP
PREPARED ON : 5-DEC-1996
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 9-DEC-1996
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1205801501

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	11.6 mg/Kg	80.1 mg/Kg	
Triacontane (SS)		6.00 mg/Kg	

Results are reported on Dry Weight basis.

Inchcape Testing Services
Environmental Laboratories

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-22
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : OTL-5#
: SD1#(15-15')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 4-DEC-1996
PREPARATION METHOD : EPA 5030
PREPARED BY : RLR
PREPARED ON : 6-DEC-1996
ANALYSIS METHOD : EPA 8240A /1
ANALYZED BY : RLR
ANALYZED ON : 6-DEC-1996
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1206824002

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acetone	0.116 mg/Kg	0.132 mg/Kg	
Benzene	0.006 mg/Kg	0.056 mg/Kg	
Bromodichloromethane	0.006 mg/Kg	0.055 mg/Kg	
Bromoform	0.006 mg/Kg	0.066 mg/Kg	
Bromomethane	0.012 mg/Kg	0.058 mg/Kg	
2-Butanone (MEK)	0.058 mg/Kg	< 0.058 mg/Kg	U
Carbon disulfide	0.006 mg/Kg	0.040 mg/Kg	
Carbon tetrachloride	0.006 mg/Kg	0.047 mg/Kg	
Chlorobenzene	0.006 mg/Kg	0.058 mg/Kg	
Chlorodibromomethane	0.006 mg/Kg	0.062 mg/Kg	
Chloroethane	0.012 mg/Kg	0.066 mg/Kg	
2-Chloroethyl vinyl ether	0.012 mg/Kg	< 0.012 mg/Kg	U
Chloroform	0.006 mg/Kg	0.061 mg/Kg	

Inchcape Testing Services
Environmental Laboratories

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-22
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Soil for IRPIMS
ID MARKS : OTL-5#
: SD1#(15-15')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 4-DEC-1996
PREPARATION METHOD : EPA 3550A
PREPARED BY : MCP
PREPARED ON : 5-DEC-1996
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 6-DEC-1996
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1205801501

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	11.6 mg/Kg	83.2 mg/Kg	
Triacontane (SS)		6.12 mg/Kg	

Results are reported on Dry Weight basis.

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-23
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: LB1#(0-0')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 5-DEC-1996
PREPARATION METHOD : EPA 5030
PREPARED BY : MGD
PREPARED ON : 5-DEC-1996
ANALYSIS METHOD : EPA 8240A /1
ANALYZED BY : MGD
ANALYZED ON : 5-DEC-1996
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1205824007

VOLATILE ORGANICS				
TEST REQUESTED	DETECTION LIMIT		RESULTS	FLAG
Acetone	100 µg/L	<	100 µg/L	U
Benzene	5.0 µg/L	<	5.0 µg/L	U
Bromodichloromethane	5.0 µg/L	<	5.0 µg/L	U
Bromoform	5.0 µg/L	<	5.0 µg/L	U
Bromomethane	10.0 µg/L	<	10.0 µg/L	U
2-Butanone (MEK)	50.0 µg/L	<	50.0 µg/L	U
Carbon disulfide	5.0 µg/L	<	5.0 µg/L	U
Carbon tetrachloride	5.0 µg/L	<	5.0 µg/L	U
Chlorobenzene	5.0 µg/L	<	5.0 µg/L	U
Chlorodibromomethane	5.0 µg/L	<	5.0 µg/L	U
Chloroethane	10.0 µg/L	<	10.0 µg/L	U
2-Chloroethyl vinyl ether	10.0 µg/L	<	10.0 µg/L	U
Chloroform	5.0 µg/L	<	5.0 µg/L	U

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DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-23
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: LB1#(0-0')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 5-DEC-1996
ANALYZED BY : MGD
ANALYZED ON : 5-DEC-1996
ANALYSIS METHOD : EPA 8240 /1
METHOD FACTOR : 1
QC BATCH NO : 1205824007

TENTATIVELY IDENTIFIED COMPOUNDS				
COMPOUND	RETENTION TIME	FRACTION	RESULT	FLAG
No compounds detected above		VOA	10 ug/L	N

Results are reported on Dry Weight basis.

Inchcape Testing Services
Environmental Laboratories

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-24
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: BS1#(0-0')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 5-DEC-1996
PREPARATION METHOD : EPA 5030
PREPARED BY : MGD
PREPARED ON : 5-DEC-1996
ANALYSIS METHOD : EPA 8240A /1
ANALYZED BY : MGD
ANALYZED ON : 5-DEC-1996
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1205824007

VOLATILE ORGANICS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Acetone	100 µg/L	47.3 µg/L	J
Benzene	5.0 µg/L	51.0 µg/L	
Bromodichloromethane	5.0 µg/L	53.4 µg/L	
Bromoform	5.0 µg/L	46.8 µg/L	
Bromomethane	10.0 µg/L	65.2 µg/L	
2-Butanone (MEK)	50.0 µg/L	< 50.0 µg/L	U
Carbon disulfide	5.0 µg/L	51.8 µg/L	
Carbon tetrachloride	5.0 µg/L	125 µg/L	
Chlorobenzene	5.0 µg/L	47.8 µg/L	
Chlorodibromomethane	5.0 µg/L	48.4 µg/L	
Chloroethane	10.0 µg/L	63.9 µg/L	
2-Chloroethyl vinyl ether	10.0 µg/L	< 10.0 µg/L	U
Chloroform	5.0 µg/L	50.9 µg/L	

Inchcape Testing Services
Environmental Laboratories

DATE RECEIVED : 5-DEC-1996

REPORT NUMBER : D96-13833-24
REPORT DATE : 18-DEC-1996

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ADDRESS : 1700 Broadway, Ste. 900
: Denver, CO 80290
ATTENTION : Mr. Craig Snyder

SAMPLE MATRIX : Water Quality Control for IRPIMS
ID MARKS : LABQC#
: BS1#(0-0')
PROJECT : 726876 AFP PJKS Site ST35
PURCHASE ORDER NO : 726876.30122
DATE SAMPLED : 5-DEC-1996
PREPARATION METHOD : EPA 3510B
PREPARED BY : JMR
PREPARED ON : 5-DEC-1996
ANALYSIS METHOD : EPA 8015M /1
ANALYZED BY : VHL
ANALYZED ON : 6-DEC-1996
DILUTION FACTOR : 1
METHOD FACTOR : 1
QC BATCH NO : 1205801502

TOTAL EXTRACTABLE HYDROCARBONS			
TEST REQUESTED	DETECTION LIMIT	RESULTS	FLAG
Total Extractable Hydrocarbons	1000 µg/L	2380 µg/L	
Triacontane (SS)		172 µg/L	

Results are reported on Dry Weight basis.

REPORT NUMBER : D96-13833-25 PAGE 2
ANALYSIS METHOD : EPA 8240A /1

VOLATILE ORGANICS				
TEST REQUESTED	DETECTION LIMIT		RESULTS	FLAG
Chloromethane	10.0 µg/L	<	10.0 µg/L	U
1,1-Dichloroethane	5.0 µg/L	<	5.0 µg/L	U
1,2-Dichloroethane	5.0 µg/L	<	5.0 µg/L	U
1,1-Dichloroethene	5.0 µg/L	<	5.0 µg/L	U
cis-1,2-Dichloroethene	5.0 µg/L	<	5.0 µg/L	U
trans-1,2-Dichloroethene	5.0 µg/L	<	5.0 µg/L	U
1,2-Dichloropropane	5.0 µg/L	<	5.0 µg/L	U
cis-1,3-Dichloropropene	5.0 µg/L	<	5.0 µg/L	U
trans-1,3-Dichloropropene	5.0 µg/L	<	5.0 µg/L	U
Ethylbenzene	5.0 µg/L	<	5.0 µg/L	U
2-Hexanone	50.0 µg/L	<	50.0 µg/L	U
Methylene chloride	5.0 µg/L	<	5.0 µg/L	U
4-Methyl-2-pentanone	50.0 µg/L	<	50.0 µg/L	U
Styrene	5.0 µg/L	<	5.0 µg/L	U
1,1,2,2-Tetrachloroethane	5.0 µg/L	<	5.0 µg/L	U
Tetrachloroethene	5.0 µg/L	<	5.0 µg/L	U
Toluene	5.0 µg/L	<	5.0 µg/L	U
1,1,1-Trichloroethane	5.0 µg/L	<	5.0 µg/L	U
1,1,2-Trichloroethane	5.0 µg/L	<	5.0 µg/L	U
Trichloroethene	5.0 µg/L	<	5.0 µg/L	U
Vinyl acetate	50.0 µg/L	<	50.0 µg/L	U
Vinyl chloride	2.0 µg/L	<	2.0 µg/L	U
m,p-Xylene	5.0 µg/L	<	5.0 µg/L	U
o-Xylene	5.0 µg/L	<	5.0 µg/L	U
1,2-Dichloroethane-d4 (SS)			49.2 µg/L	
Toluene-d8 (SS)			51.9 µg/L	
Bromofluorobenzene (SS)			44.2 µg/L	

Results are reported on Dry Weight basis.

Inchcape Testing Services
Environmental Laboratories

1089 E. Collins Blvd.
Richardson, TX 75081
Tel. 972-238-5591
Fax 972-238-5592

DESCRIPTION OF REPORTING FLAGS

U - Indicates compound was analyzed for but not detected.

J - Indicates an estimated value. This flag is used if the compound is detected but is below the Reporting Limit.

D - Indicates all compounds in an analysis at a secondary dilution.

N - Indicates presumptive evidence of a compound. This flag is only used for tentatively identified compounds where the identification is based on a mass spectral library search.

E - Indicates the compounds whose concentration exceed the limit of the instrument or the Laboratory Information Management System. The concentration will be greater than the concentration listed.

Q - Indicates the surrogate recovery is outside the defined QC limits.

M - Indicates the matrix has interfered with the recovery of the surrogates.

O - Indicates the surrogate was lost because of dilution.

Inchcape Testing Services
Environmental Laboratories

1089 E. Collins Blvd.
Richardson, TX 75081
Tel. 214-258-5591
Fax. 214-258-5592

QC SUMMARY

Inchcape Testing Services
Environmental Laboratories

1089 E. Collins Blvd.
Richardson, TX 75081
Tel. 972-238-5591
Fax 972-238-5592

REPORT DATE : 15-JAN-1997 REPORT NUMBER : D96-13833

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ATTENTION : Mr. Craig Snyder

LABORATORY QUALITY CONTROL REPORT

ANALYTE	1,1-Dichloroethene	Trichloroethene	Benzene	Toluene	Chlorobenzene
BATCH NO.	1205824007	1205824007	1205824007	1205824007	1205824007
LCS LOT NO.	AB598-35-1	AB598-35-1	AB598-35-1	AB598-35-1	AB598-35-1
PREP METHOD	EPA 5030	EPA 5030	EPA 5030	EPA 5030	EPA 5030
PREPARED BY	MGD	MGD	MGD	MGD	MGD
ANALYSIS METHOD	EPA 8240A	EPA 8240A	EPA 8240A	EPA 8240A	EPA 8240A
ANALYZED BY	MGD	MGD	MGD	MGD	MGD
UNITS	µg/L	µg/L	µg/L	µg/L	µg/L
METHOD BLANK	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00
SPIKE LEVEL	50.0	50.0	50.0	50.0	50.0
SPK REC LIMITS	55.0 - 130	60.0 - 140	65.0 - 135	47.0 - 150	37.0 - 160
SPK RPD LIMITS	41.0	33.0	35.0	24.0	32.0
MS RESULT	55.0	49.4	165	55.5	49.7
MS RECOVERY %	110	98.8	94.0	111	99.4
MSD RESULT	54.4	48.2	162	54.4	50.5
MSD RECOVERY %	109	96.4	88.0	109	101
MS/MSD RPD %	1.10	2.46	6.59	2.00	1.60
BS RESULT	54.2	51.3	51.0	50.0	47.8
BS RECOVERY %	108	103	102	100	95.6
BSD RESULT	54.4	53.1	51.3	51.6	48.1
BSD RECOVERY %	109	106	103	103	96.2
BS/BSD RPD %	0.37	3.45	0.59	3.15	0.63
DUP RPD LIMITS	---	---	---	---	---
DUPLICATE RPD %	NA	NA	NA	NA	NA
LCS LEVEL	50.0	50.0	50.0	50.0	50.0
LCS REC LIMITS	55.0 - 130	60.0 - 140	65.0 - 135	47.0 - 150	37.0 - 160
LCS RESULT	SEE_BS	SEE_BS	SEE_BS	SEE_BS	SEE_BS
LCS RECOVERY %	SEE_BS	SEE_BS	SEE_BS	SEE_BS	SEE_BS
SPIKE SAMPLE ID	13759-1	13759-1	13759-1	13759-1	13759-1
SAMPLE VALUE	< 5.00	< 5.00	118	< 5.00	< 5.00
DUP SAMPLE ID	---	---	---	---	---
DUP SAMPLE VAL/1	---	---	---	---	---
DUP SAMPLE VAL/2	---	---	---	---	---

SEE_BS LCS and LCS Duplicate reported as BS and BSD.
NA Not applicable

Inchcape Testing Services
Environmental Laboratories

1089 E. Collins Blvd.
Richardson, TX 75081
Tel. 972-238-5591
Fax 972-238-5592

REPORT DATE : 15-JAN-1997 REPORT NUMBER : D96-13833

SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ATTENTION : Mr. Craig Snyder

LABORATORY QUALITY CONTROL REPORT

ANALYTE	1,1-Dichloroethene	Trichloroethene	Benzene	Toluene	Chlorobenzene
BATCH NO.	1209824001	1209824001	1209824001	1209824001	1209824001
LCS LOT NO.	AB598-46-2	AB598-46-2	AB598-46-2	AB598-46-2	AB598-46-2
PREP METHOD	EPA 5030	EPA 5030	EPA 5030	EPA 5030	EPA 5030
PREPARED BY	RLR	RLR	RLR	RLR	RLR
ANALYSIS METHOD	EPA 8240A	EPA 8240A	EPA 8240A	EPA 8240A	EPA 8240A
ANALYZED BY	RLR	RLR	RLR	RLR	RLR
UNITS	µg/Kg	µg/Kg	µg/Kg	µg/Kg	µg/Kg
METHOD BLANK	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00
SPIKE LEVEL	50.0	50.0	50.0	50.0	50.0
SPK REC LIMITS	55.0 - 130	60.0 - 140	65.0 - 135	47.0 - 150	37.0 - 160
SPK RPD LIMITS	41.0	33.0	35.0	24.0	32.0
MS RESULT	35.7	41.3	39.8	39.6	45.0
MS RECOVERY %	71.4	82.6	79.6	79.2	90.0
MSD RESULT	38.7	44.9	42.5	43.9	48.6
MSD RECOVERY %	77.4	89.8	85.0	87.8	97.2
MS/MSD RPD %	8.06	8.35	6.56	10.3	7.69
BS RESULT	35.7	42.8	41.8	42.7	48.1
BS RECOVERY %	71.4	85.6	83.6	85.4	96.2
BSD RESULT	37.7	41.7	40.8	40.9	45.7
BSD RECOVERY %	75.4	83.4	81.6	81.8	91.4
BS/BSD RPD %	5.45	2.60	2.42	4.31	5.12
DUP RPD LIMITS	---	---	---	---	---
DUPLICATE RPD %	NA	NA	NA	NA	NA
LCS LEVEL	50.0	50.0	50.0	50.0	50.0
LCS REC LIMITS	55.0 - 130	60.0 - 140	65.0 - 135	47.0 - 150	37.0 - 160
LCS RESULT	SEE_BS	SEE_BS	SEE_BS	SEE_BS	SEE_BS
LCS RECOVERY %	SEE_BS	SEE_BS	SEE_BS	SEE_BS	SEE_BS
SPIKE SAMPLE ID	13973-5	13973-5	13973-5	13973-5	13973-5
SAMPLE VALUE	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00
DUP SAMPLE ID	---	---	---	---	---
DUP SAMPLE VAL/1	---	---	---	---	---
DUP SAMPLE VAL/2	---	---	---	---	---

SEE_BS LCS and LCS Duplicate reported as BS and BSD.
NA Not applicable

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SAMPLE SUBMITTED BY : Parsons Engineering Science, Inc
ATTENTION : Mr. Craig Snyder

LABORATORY QUALITY CONTROL REPORT

ANALYTE	Total Petroleum Hydrocarbon	Total Petroleum Hydrocarbon	Total Petroleum Hydrocarbon
BATCH NO.	1205801502	1205801501	AB949-31
LCS LOT NO.	AB868-60	AB868-60	AB868-60
PREP METHOD	EPA 3510B	EPA 3550A	EPA 3550A
PREPARED BY	TAP	MCP	CLT
ANALYSIS METHOD	EPA 8015M	EPA 8015M	EPA 8015M
ANALYZED BY	VHL	VHL	VHL
UNITS	mg/L	mg/Kg	µg/Kg
METHOD BLANK	< 0.500	< 10.0	< 10000
SPIKE LEVEL	2.50	83.3	83300
SPK REC LIMITS	35.0 - 115	30.0 - 150	30.0 - 150
SPK RPD LIMITS	25.0	25.0	25.0
MS RESULT	NA	69.2	490000
MS RECOVERY %	NA	83.1	220
MSD RESULT	NA	71.9	496000
MSD RECOVERY %	NA	86.3	227
MS/MSD RPD %	NA	3.83	3.23
BS RESULT	2.38	83.1	86900
BS RECOVERY %	95.2	99.8	104
BSD RESULT	1.92	79.1	84600
BSD RECOVERY %	76.8	95.0	102
BS/BSD RPD %	21.4	4.93	2.68
DUP RPD LIMITS	---	---	---
DUPLICATE RPD %	NA	NA	NA
LCS LEVEL	2.50	---	83300
LCS REC LIMITS	35.0 - 115	---	30.0 - 150
LCS RESULT	SEE_BS	SEE_BS	SEE_BS
LCS RECOVERY %	SEE_BS	SEE_BS	SEE_BS
SPIKE SAMPLE ID	---	13833-11	D96-14033-2
SAMPLE VALUE	---	< 10.0	307000
DUP SAMPLE ID	---	---	---
DUP SAMPLE VAL/1	---	---	---
DUP SAMPLE VAL/2	---	---	---

NA Not applicable
SEE_BS LCS and LCS Duplicate reported as BS and BSD.